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WITH MANY DIAGRAMS

THE BENNETT COLLEGE
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SHEFFIELD

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Reference Library of the Bennett College: "Geography"

SECTION I.—THE BRITISH ISLES

Chapter I

A.—THE NATURAL DIVISIONS OF ENGLAND AND WALES

ENGLAND and Wales may be divided into ten sections, distinguished from each other by the kinds of rock of which they are composed, the height of the land, and the occupations of the people. These divisions, which are shown in Fig. 1, are:—

I. The London Basin.
II. The Weald, with the North and South Downs.
III. The Hampshire Basin.
IV. The Scarp-lands.
V. Eastern England, comprising:
    (a) The eastern part of Yorkshire.
    (b) Lincolnshire.
    (c) The Fen District.
    (d) East Anglia.
VI. South-western England.
VII. The Midland Plain, with its extensions:
    (a) The Lancashire and Cheshire Plain (or Western Plain).
    (b) The Plain of York.
    (c) The Vale of Trent.
VIII. The Pennines.
IX. The Lake District.
X. Wales.

Each of these divisions will be dealt with in detail in the succeeding chapters, but the student should at once make himself familiar with the position and general features of each division, by comparison of the map of Natural Divisions with the physical maps shown on pages 8, 9, and 12-15 of the Atlas.

One of the best ways of doing this is to work out a com-

parison between the north-west and the south-east of England and Wales. The line dividing these two halvse may be taken as running from the mouth of the river Tees, on the north-east coast, to Lyme Regis in Dorset (see the broken line in Fig. 1). Draw this line on the physical or bathy-orographical maps in the atlas. (NOTE.—"Bathy" refers to the *depths of the sea*, which are shown in varying tints of blue, the darkest shading representing the deepest sea; "orographical" refers to the *height of the land*, the lowest land being coloured green, the highest land dark brown. This kind of map is the most useful of all maps, and the student should so constantly refer to it during his reading that he may become familiar with every detail of it.)

By reference to the physical map and other maps, then, verify the following contrasts:—

(1) The north-west of Britain contains all the highest land, the only large areas of low land being the valley of the river Eden, flowing to Solway Firth; the Western Plain of Lancashire and Cheshire; the extension of the Midland Plain into north Yorkshire; and the coast-lands of Durham and Northumberland. The position and extent of the chief masses of high land should be carefully learnt. They are:—(*a*) the Cumbrian Mountains of the Lake District of Cumberland and Westmorland; (*b*) the Cheviots, on the Scottish border; (*c*) the Pennines; (*d*) the Cambrian Mountains of Wales; (*e*) Dartmoor in Devonshire, Exmoor in the north of Devon and Somerset, Bodmin Moor in Cornwall, the Mendip Hills and the Blackdown Hills in Somerset.

The south-east of England, on the other hand, consists almost entirely of plain land, crossed only by ranges of hills which nowhere reach a height of 1500 feet. Note especially the following: (*a*) the Cotswold Hills, (*b*) the Marlborough Downs, (*c*) the Chiltern Hills, (*d*) the North Downs, (*e*) the South Downs, (*f*) the Dorset Heights.

(NOTE.—The student should now trace an outline of England and Wales, and test himself by trying to draw on it all the above-mentioned physical features.)

(2) The coast-line of the western side is much more indented, or broken into bays and estuaries, than that of the southern and eastern half. Learn the positions of all the bays and river mouths shown on the map. Note particularly that on the east coast of Britain there are no really good harbours between the Humber and the mouth of the Thames. (The Wash and the estuaries just north of the Thames are too shallow to be of much use.)

(3) The rivers of the north-western half, with the exception of the Severn, are all comparatively short, and therefore rather rapid; while the rivers of eastern England are longer and slower.

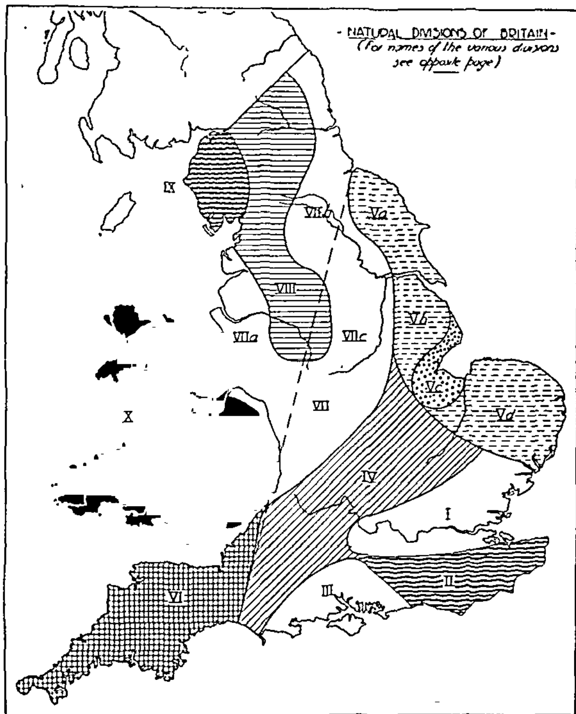

- NATURAL DIVISIONS OF BRITAIN -
(For names of the various divisions see opposite page)
IX
VIIb
Va
VIII
VIIa
VIIc
Vb
Vc
Vd
X
VII
IV
I
II
III
VI

Fig. 1

This is because the high land comes nearer the coast on the west than on the east. The Severn, which is the longest river in Great Britain, forms a remarkable exception to this rule; in ages gone by it flowed to the Thames, but a stream which flowed into the Bristol Channel cut down its valley so much that it "tapped" or "captured" the Severn.

(NOTE.—Learn the names and positions of the rivers, and practise putting them on a map.)

(4) On the rainfall map, observe that nearly all the western half has heavy rainfall, whereas the east has light rainfall.

(5) The coalfield map shows that all the coalfields, with the exception of the "new" coalfield of Kent, are in the north-western half.

(6) The population map shows that the north-west has a very dense population in the districts where the coal is, but very low population in the mountainous districts. In the south-east the population is more evenly distributed, the only area of very dense population being around London. There is no large district with a very small population.

The student should now try to find out for himself the characteristics of each of the natural divisions mentioned above. During the further study of England and Wales, note other contrasts between these two halves of the country, particularly as these are often asked for at examinations.

B.—BRITISH SEAS

1.—**The Continental Shelf.** This is the area of shallow sea, less than 100 fathoms (600 feet) deep, which, as shown on the physical map of Europe, forms approximately a rectangle enclosing the British Isles and the adjacent seas. It is called the Continental Shelf because it is really the shelf on which the continent stands. It was formerly dry land. Beyond the 100-fathom line the sea-floor slopes, much more steeply, to great depths. The Continental Shelf has had important effects on work and trade in Britain, viz.:—

(1) *Fishing.*—In the shallow waters over the Shelf, shoals of fish, such as herring, mackerel, and cod, find abundant food; hence these shallow seas are important fishing-grounds. Note particularly the Dogger Bank, which is only 10-20 fathoms deep, and forms one of the world's chief fishing-grounds.

(2) *The tides* rise higher on the Continental Shelf than they would if the sea were very deep. This enables ships to sail far up the estuaries of rivers.

The student should be able to draw on a map: (*a*) the edge of the Continental Shelf; (*b*) specially deep parts near it, e.g. the Rockall Depression and the Norway Deep; (*c*) noteworthy shallow areas on the Shelf, such as the Dogger Bank; and (*d*) the submarine ridge called the Wyville-Thompson ridge, running from Scotland via the Faroes to Iceland.

2.—**The Tides.** The tides are caused by the attraction of the moon and, to a lesser degree, of the sun. Both these bodies, by the action of gravity, try to pull the ocean towards them, thus heaping up the water, which travels like a great wave, known as the tide, round the world. High and low tide occur twice every day. The highest tides, known as *spring tides*, occur about once a fortnight (actually, when the sun and the moon are both pulling the water in the same direction). When sun and moon are pulling at right angles to each other the tide is not as high; it is then known as a *neap tide*.

The wave of the tide, on reaching the south-western part of the Continental Shelf, splits up into three branches. One goes round the north of Ireland and Scotland, and then southward through the North Sea; the second goes up the Irish Sea; the third goes up the English Channel. Near the Thames estuary the high tides of the first and third branches meet, giving very high tides up to London.

Effects of Tides.

(1) They help commerce by enabling ships to get far up river mouths.

(2) They help to keep some estuaries open by sweeping away the mud brought down by rivers.

(3) They deposit sand and mud in other places, e.g. at Spurn Point at the mouth of the Humber, thus hindering commerce.

C.—CLIMATE OF THE BRITISH ISLES

1.—**Rainfall.** Rain is caused when air laden with water vapour is compelled to rise, for not only is it cooler higher up, but the actual rising of the air cools it.

Thus when a wind from the ocean encounters a mountain range, it has to rise, and therefore drops its moisture in the form of rain. Britain is in the belt of the westerly winds. About 250 days in the year, on the average, the winds of our country blow from somewhere between south and west. Coming from the ocean, they are full of water vapour. When they reach the land they are compelled to rise by the mountains which lie near the west coast. Consequently the wettest regions are the high lands on the west.

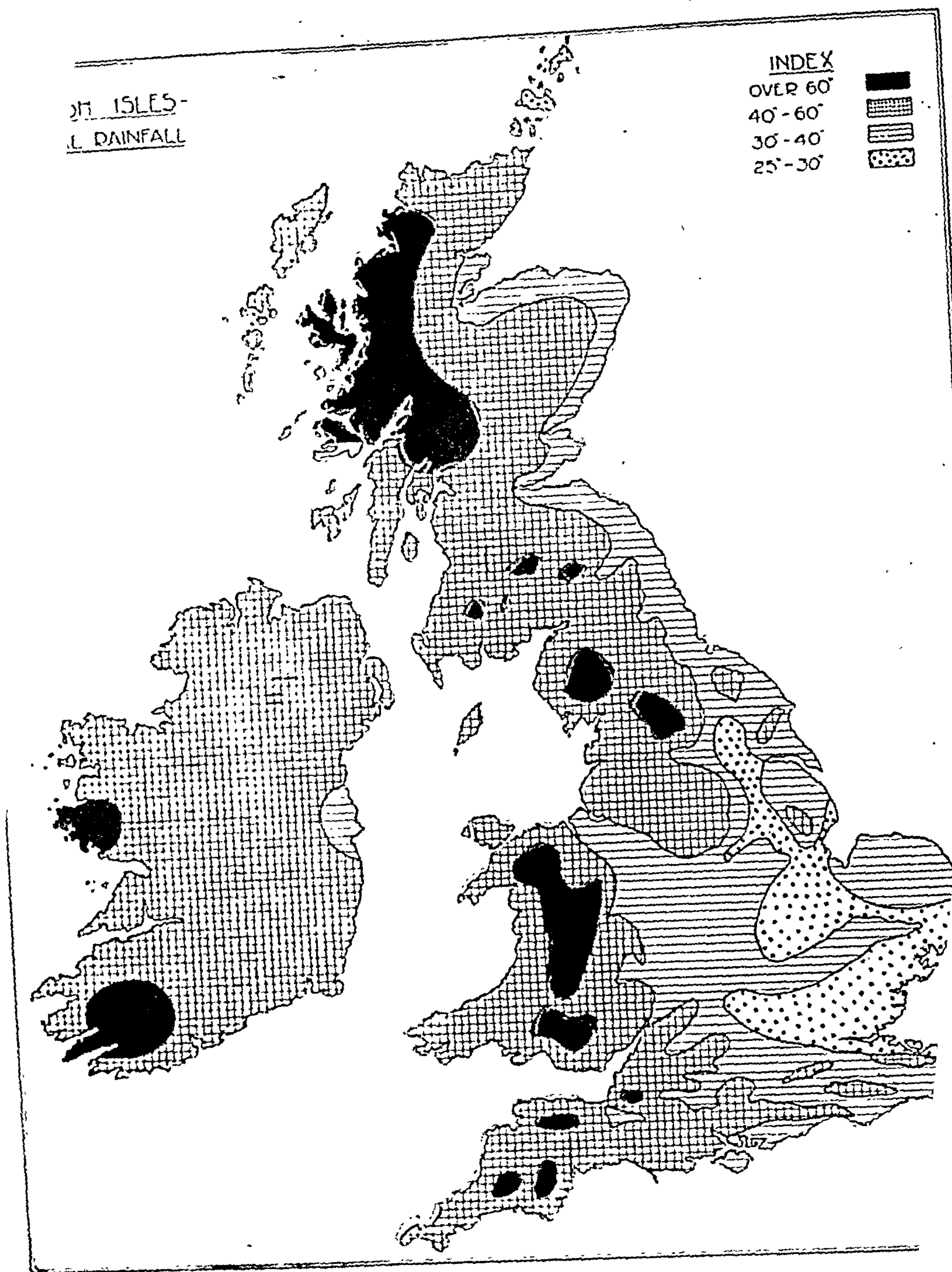


Fig. 2

Notice on the rainfall map that each of the following have 60 inches of rain per year: Dartmoor, Exmoor, Lake District, Northern Pennines, the highest parts of the Southern Uplands of Scotland, all the western side of the Highlands of Scotland, and the mountains of south-western Ireland.

When the wind has passed over the mountains, it has lost its moisture, and therefore the eastern half of England has little rain. Note particularly: (*a*) Essex and Suffolk, (*b*) the Fenland, (*c*) the Vale of Trent, (*d*) the Plain of York.

2.—**Temperature.** This is shown on the map by means of isotherms. These are lines joining places with the same average temperature. The isotherms in Figs. 3 and 4 are sea-level isotherms, i.e. instead of showing the actual temperatures they show the temperature as it would be if all the land were at sea-level. The following are the important points to be noted in regard to the temperature of the British Isles:—

January:

(1) The isotherms run nearly north and south. (Learn the course of the 40° F. line.)

(2) The highest sea-level temperatures are in the south-west and west of Ireland, the lowest are on the eastern side of Britain.

(3) The north coast of Scotland is as warm as the south coast of England.

(4) Places on the coast are warmer than places in the interior at the same latitude.

The reasons for all the above can be traced to two causes:—

(*a*) Land cools more quickly than the sea in winter; hence the interior of the country is colder than the coast.

(*b*) Winds from the sea warm the land in winter; hence the west coast, which gets the winds from the Atlantic, is warmer than the east coast.

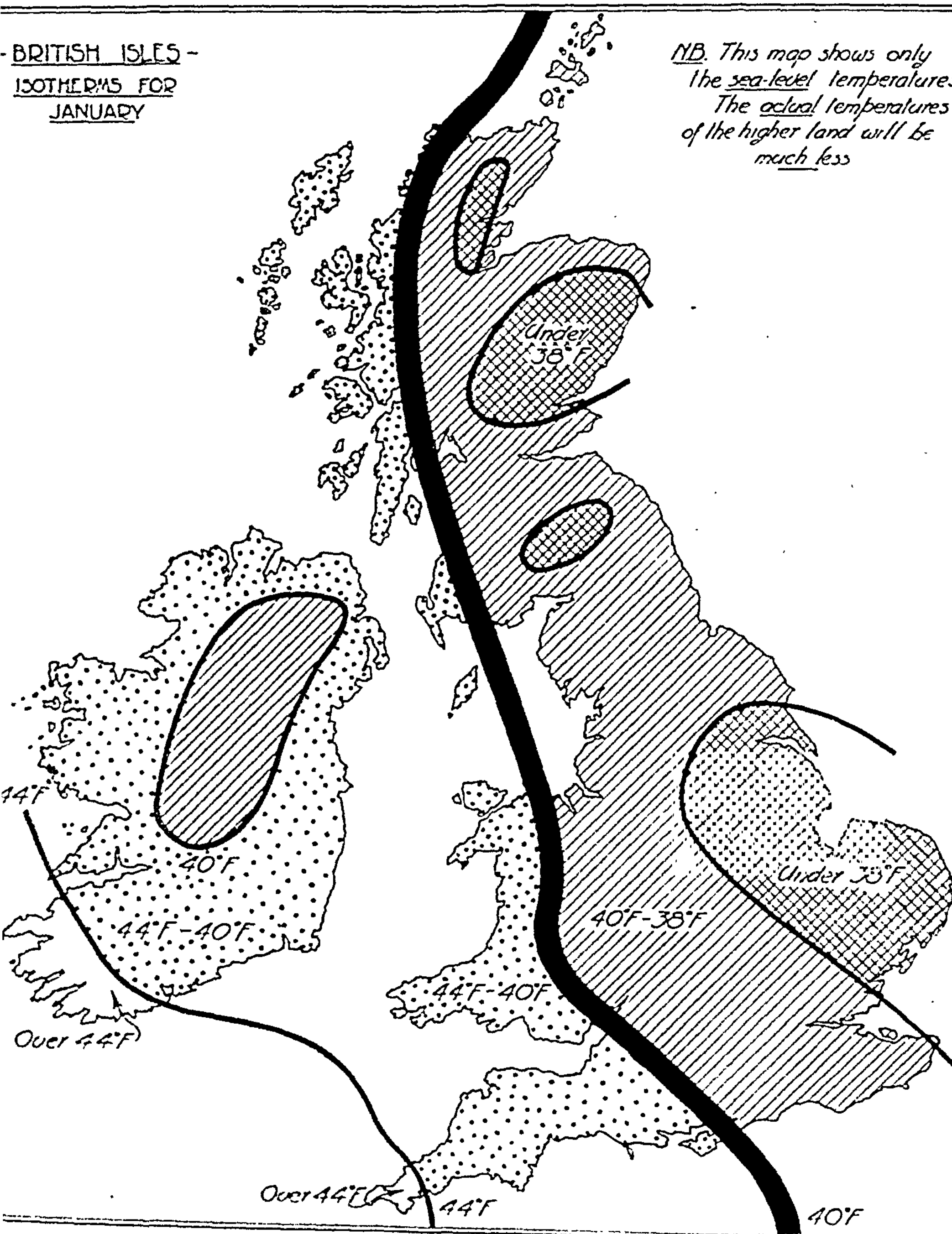
July:

(1) The isotherms run more nearly from west to east.

(2) The temperature decreases from south to north; this is because the sun is more nearly overhead at noon in the south than in the north.

(3) The isotherms bend northward over the land and southward over the sea. (Learn the course of the 60° isotherm.) This shows that the land is warmer than the sea in summer. The reason for this is that the land gets hot more quickly than the sea in summer, and so the coasts are cooled by the sea-breezes.

(4) The highest sea-level temperature is in the south-east of England; the reason being that this is where the country is widest,



- BRITISH ISLES -
ISOTHERMS FOR
JANUARY
N.B. This map shows only the sea-level temperatures. The actual temperatures of the higher land will be much less
Under 38°F
40°F
44°F-40°F
44°F
Over 44°F
44°F-40°F
40°F-38°F
Under 38°F
Over 44°F
44°F
40°F

Fig. 3

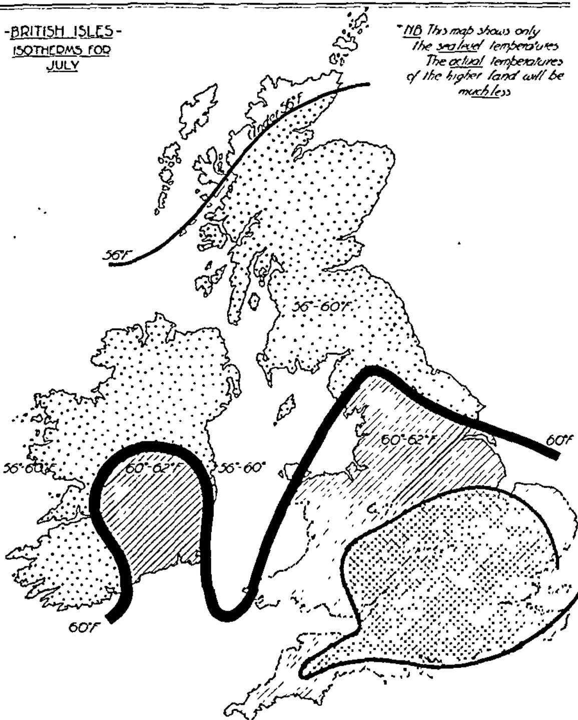

-BRITISH ISLES-
ISOTHERMS FOR
JULY
NB This map shows only the sea level temperatures The actual temperatures of the higher land will be much less
56°F
56°-60°F
60°F
60°-62°F
56°-60°F
60°-62°F
56°-60°
60°F

Fig. 4

and therefore this part is farthest away from the influence of the winds from the ocean.

Equable and Extreme Climates.—Comparing both isotherm maps, we notice that :—

(1) The district around London has temperatures of 64 degrees in summer, and about 38 degrees in winter. The difference, or range of temperature, is thus 26 degrees.

(2) The coast of south-western Ireland has a summer temperature of about 59 degrees, and a winter temperature of about 45 degrees. The range of temperature is thus only 14 degrees.

(3) A place with a low range of temperature is said to have an equable, or oceanic, or insular climate. Such climates are only found in districts which are open to winds from the ocean.

(4) A place with a high range of temperature is said to have an extreme or continental climate. Really extreme climates are only found in the interiors of continents, far away from the influence of the ocean.

Thus, although we may say that eastern England has a more extreme, or less equable, climate than south-western Ireland, we cannot say that any part of Britain has a really extreme climate.

Chapter II

SOUTH-EASTERN ENGLAND

THE LONDON BASIN. (See Figures 5 and 6)

✓1.—**Rocks: Structure.** As shown in Fig. 5, the London Basin is formed by a downfold in the sheet of chalk. The northern edge of the basin is formed by the chalk ridges of the White Horse Hills, the Chilterns, and the East Anglian Height.

The southern edge is formed by the North Downs.

The basin is partly filled in with the London Clay, and underneath the chalk is a layer of Gault Clay.

Here and there, above the clay rise up isolated masses of sandy soil. Such hills are infertile, but dry. Consequently they

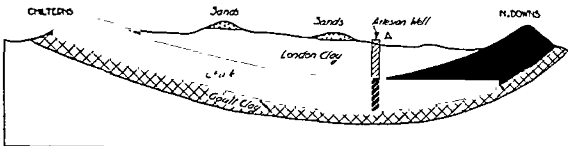


Fig 5

have become residential districts, playgrounds (e.g. Hampstead Heath), or military training camps (e.g. Aldershot).

2.—**Artesian Wells.** Chalk is porous, while clay does not allow water to percolate through it. Consequently the rain that falls on the Chilterns and North Downs soaks through the chalk, and gradually finds its way to the bottom of the basin, where it is held up by the Gault Clay. If a boring were made near the middle of the basin (as at A in Fig. 5) the water would be forced to the surface, thus forming an Artesian Well. The layer of London Clay above the chalk prevents the contaminated surface water of

London from penetrating to this pure artesian supply. A large part of London's water supply comes from these artesian wells. Other sources of water are :—

(*a*) From the Thames about Windsor.
(*b*) From springs in the Chilterns, whence it is conducted to London by the artificial "New River" through Hertford.

3.—**Rivers.** The Thames, with its tributary the Kennet, occupies the middle line of the basin. Note that the Upper

Fig. 6

Thames enters the basin by a deep gap above Reading, between the White Horse Hills and the Chilterns. The rivers Colne and Lea are the chief tributaries from the Chilterns. On the right bank of the river the Wey, the Mole, the Darent, and the Medway flow from the Wealden district.

To the north of the Thames estuary a series of rivers, viz. Chelmer, Blackwater, Colne, and Stour, now reach the sea by separate mouths, though they were once tributaries of the Thames when that river continued farther eastward than at present.

4.—**Economic Geography.** The London Clay forms rather

a heavy, wet soil. Formerly much wheat was grown, but now this is important only in Essex.

Dairy farming and market gardening have prospered because of the demands of London for milk, vegetables, and fruit.

Colchester, at the mouth of the Colne, and Whitstable, on the southern side of the Thames estuary, are famous for oysters.

Reading, at the confluence of the Kennet and the Thames, manufactures biscuits.

✓ 5.—**Ports.** London is of such outstanding importance that it must be dealt with alone.

Harwich, built at the end of a little peninsula in the Stour estuary, forms a good example of a packet station, being well situated for the rapid transit of passengers and mails to the Continent. Note that it is situated as far out to sea as possible, in distinction to London, which is as far inland as ships can go.

Ipswich, Colchester, and Chelmsford are built at the lowest point on the river where it was possible to make a bridge. Formerly they were important ports, but they are useless for large ships.

Chatham is the naval dockyard guarding the approach to London.

Tilbury and Queenborough are outports for London.

6.—**London.** The reasons for the growth and importance of London are:—

(*a*) The coast road from Dover and Deal crossed the Thames here.
(*b*) High ground close to the northern bank made it a suitable bridge place.
(*c*) The site was well defended in Roman times by the marshy valleys of the Lea and the Colne.
(*d*) From it routes radiate in all directions north of the Thames
(*e*) It has specially high tides (see page 5).

In modern times London has become, not only the centre of Britain, and the greatest city of the world, but the chief port in the kingdom, and also the biggest manufacturing city.

Its *import trade* is concerned mainly with Asia, Australasia, and Africa. The chief articles imported are wheat, flour, wool, butter, cheese, tea, coffee, timber, rubber, hides, fruit, tobacco, wine, leather goods, and textiles.

The *export trade* is concerned with almost every country in the world, though America does not figure as prominently as the other continents. The chief articles exported are cotton goods, metal goods and machinery, clothes, chemicals, leather goods, and rubber goods.

A special feature of London's commerce is its *transit trade*—the importation of goods for re-exportation, principally to European countries.

Routes.—All the main lines of British railways have their termini at London. Notice how they radiate in all directions like the spokes of a wheel:—the Southern Railways to Dover, Southampton, and other south-coast ports; the Great Western to Reading, thence up the Kennet and up the Thames; the London, Midland, and Scottish and the London and North-Eastern to various gaps in the Chilterns; and another London and North-Eastern Railway main line going north-eastward through Chelmsford, Colchester, and Ipswich.

THE WEALD. (See Figures 7 and 8)

1.—**Structure and Relief.** The south-eastern angle of Britain, comprising the counties of Kent, Sussex, and the southern part of Surrey, consists of an upfold of the chalk, from which the

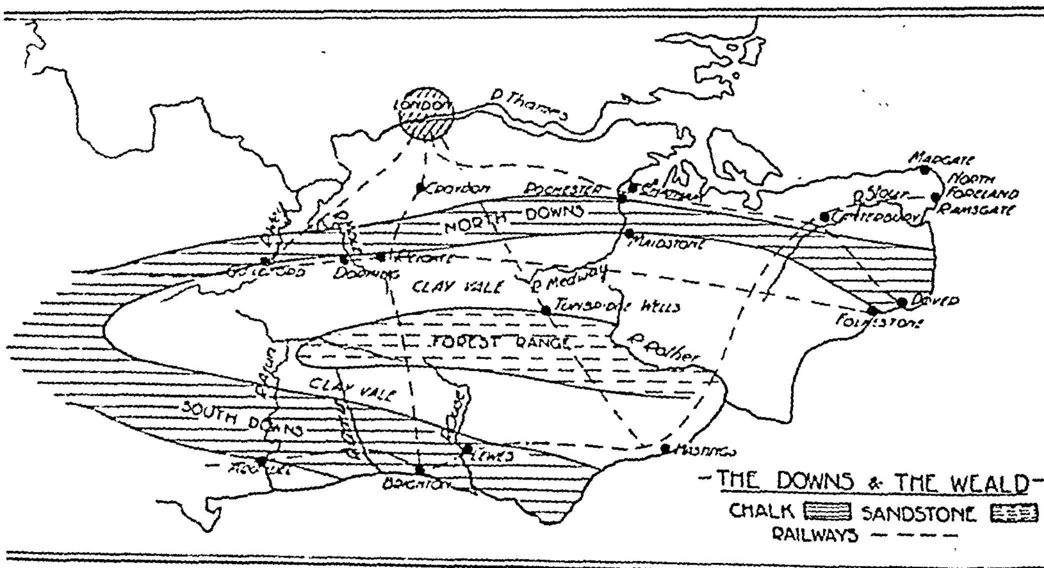


Fig. 7

top has been worn away, revealing other rocks in the middle. The northern rim of the area is formed by the chalk hills of the North Downs, and the southern rim by the South Downs. Between is the Weald (see section, Fig. 8). The Wealden Clay makes a horse-shoe-shaped valley running inside the chalk ridges. In the centre the Hastings Sands forms a ridge of high ground known as the Forest Range.

2.—**The Coast.** The chalk ridges run out to sea in headlands —the North Downs forming South Foreland, and the South Downs forming Beachy Head. The clay vale runs out to sea in the low, smooth coast between Eastbourne and Hastings, and between Winchelsea and Folkestone.

3.—**Minerals.**

(*a*) *Coal* has been found below the chalk in East Kent, and is now being worked.

(*b*) *Iron* has also been found in the new Kent coalfield. In the Weald there are deposits of iron which are not now worked.

(*c*) *Fuller's-earth*, used as a cleanser, and (*d*) *gypsum*, used for plaster-of-Paris, are also found near the centre of the Weald.

(*e*) *Brick clay* and (*f*) *building stone* are also obtained.

-SECTION ACROSS WEALD-

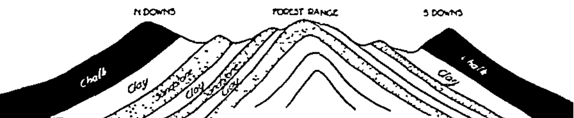


Fig. 8

4.—**Farming.**

(*a*) The short grass which grows on the dry chalk is most suitable for sheep-rearing.

(*b*) The clay vales make excellent grazing-grounds for cattle.

(*c*) The most fertile valleys, where the different kinds of soil have been mixed, are devoted largely to the culture of hops and fruit (particularly strawberries and cherries).

5.—**Rivers.** The main watershed is the Forest Range. From it the Wey, Mole, and Medway flow northward to the Thames; the Arun, the Adur, and the Sussex Ouse flow to the south coast. Notice that these rivers, as well as the Kentish Stour, cut deep gaps in the Chalk Downs.

6.—**Town Sites.** (*a*) *Gap towns* have grown up at these river gaps in the Downs, e.g. Guildford on the river Wey, Dorking on the river Mole, Arundel on the Arun, and Lewes on the Ouse. The Medway and the Stour both have a town on each side of the North Downs: Maidstone and Chatham on the former river, Ashford and Canterbury on the latter.

All these towns early became of importance as fortress towns guarding the gaps, and as market towns.

Croydon, to the south of London, stands at the foot of a gap which has no river in it. Such a gap is called a "dry gap" or a "wind gap."

(b) Some towns have grown up as *residential places*, e.g. Tunbridge Wells, on the dry, healthy Forest Range.

(c) *Ports*.—Dover has become of importance as the nearest port to France. Hence it is a packet station and a naval station. Folkestone and Newhaven are also packet stations.

(d) *Holiday Resorts*.—Seaside resorts such as Margate, Ramsgate, Hastings, Eastbourne, Brighton, Worthing, and Bognor owe their prosperity mainly to the proximity of London, and the rapid service from the metropolis.

7.—**Routes.** Trace out the following lines of the Southern Railways on a sketch-map, and note how their course is controlled by physical features:—

(a) From London, along the northern edge of the North Downs, crossing the Medway at Rochester, and the Stour at Canterbury, to the coast at Ramsgate and Dover.

(b) Southward from London, through the gap formed by the river Darent, thence through Sevenoaks and Tunbridge Wells to Hastings.

(c) Due southward through the dry gap of Croydon to Reigate, then across the northern Clay Vale, over the Forest Range, across the southern Clay Vale and the South Downs to Brighton.

(d) The longitudinal route in the northern Clay Vale, at the foot of the North Downs, through Guildford, Dorking, and Ashford to Folkestone.

(e) The route connecting up the towns of the south coast, from Southampton, through Chichester, Brighton, etc., to Ashford. Note that this line goes inland at two places so as to avoid difficulties: firstly, near Beachy Head, where the Downs form high cliffs close to the sea, and, secondly, near Romney Marsh.

THE HAMPSHIRE BASIN. (See Figures 9 and 10)

1.—**Position.** This basin encloses most of the county of Hampshire, the south-eastern angle of Wiltshire, the southern half of Dorset, the Isle of Wight, and a small portion of south-western Sussex.

2.—**Structure and Relief.** Like its counterpart, the London Basin, the Hampshire Basin is formed by a downfold in the chalk (see Fig. 10). The northern edge forms the chalk hills of the Western Downs, Salisbury Plain, and the South Downs.

The southern edge forms the chalk hills of the Purbeck Downs, continued by the line of hills which form the backbone of the Isle of Wight.

The interior of the basin is filled in with sand and some clay, forming a plain which is below 500 feet above sea-level. Note on the map: the Vale of Dorset in the west of the basin, the New Forest in the centre, and the Plain of Selsey on the east.

3.—**Rivers.** The Frome, flowing eastward down the Vale of

Fig 9

Dorset to Poole Bay, was formerly continued through the Solent and Spithead. The Stour, Avon, Test, and Itchen were then tributaries of this main river. Later the land sank to its present height and the sea flowed in to the Solent and Spithead, thus forming a "drowned" coast.

4.—**Coast-line.** Where the chalk ridges run out to sea they form the prominent headlands of the Needles and Culver Cliff. Elsewhere the low plain of the basin proper makes a low, even coast-line.

5.—**Agriculture.** (*a*) The chalk uplands are dry and bare, supporting only short grass; they are therefore given up to sheep-runs. The wide, open spaces of Salisbury Plain make it well

dapted for military manœuvres. (*b*) The valleys in the chalk idges are more fertile, and support much mixed agriculture. (*c*) The Hampshire Lowland in the centre of the basin, being formed nainly of sandy soil, is infertile. Hence large tracts of it are left uncultivated (e.g. the New Forest).

6.—**Town Sites.** (*a*) Southampton. The main tidal current flows up the Channel, and on encountering the Isle of Wight splits into two branches. One branch goes up the Solent, the other round the Isle of Wight and up Spithead. Both cause a high tide at Southampton, but the latter branch arrives about two hours later than the former. Thus Southampton receives four high tides per day instead of the usual two. The port is

—SECTION ACROSS HAMPSHIRE BASIN—

Fig. 10

well situated for trade with the Midlands and the North of England, and by its position tends to tap the trade of the Channel before it reaches London. The chief countries traded with are, naturally, France, the Mediterranean region, Africa, India, Australia, North and South America. The imports consist mainly of foodstuffs (frozen meat, butter, bacon, and eggs) and raw materials (wool and rubber). The exports are chiefly manufactured articles such as cotton goods, woollen clothing, and leather goods. The passenger service from this port is becoming increasingly important.

(*b*) Portsmouth is an even larger town than Southampton, though not so important a port. Its importance is due chiefly to its position, on a good harbour, at the foot of an easily defended chalk ridge controlling the Channel and Spithead. It is, consequently, a great naval station. The naval dockyard and arsenal provide much employment.

(c) Winchester, in about the centre of the basin, on an easily defended site, and controlling routes in all directions, was the early Anglo-Saxon capital. (d) Salisbury, another ancient town, grew up at the *confluence of several tributaries of the Avon*. (e) Dorchester obviously controls the western entrance to the basin, down the Vale of Dorset. (f) Chichester holds a similar position on the eastern side. (g) Wilton has given its name to a certain type of carpets, made originally from the local wool. (h) Andover and (i) Petersfield mark the entrances into the basin of the railways from London.

THE SCARP LANDS. (See Figures 11 and 12)

1.—**Structure.** The physical map shows two lines of hills crossing the middle of England from south-west to north-east, viz.: the chalk ridges of the Western Downs, White Horse Hills, Chiltern Hills, and East Anglian Heights; and the limestone ridges of the Cotswolds, Edge Hill, and the Northampton uplands. Between these is a long hollow, often called the Oxford Clay Vale. This latter is made up of (a) the Vale of Blackmoor, (b) the White Horse Vale, (c) the Upper Thames Valley around Oxford, (d) the Vale of Aylesbury in Buckinghamshire, and (e) the basin of the Great Ouse, which flows to the Wash.

A section across these ridges is shown in Fig. 11. It will be noticed that all the ridges have a steep side facing north-west, and a gentle slope to the south-east. Such ridges are known as escarpments, or more shortly "scarps." Hence the name "scarp lands" given to the area through which they run.

2.—**Farming.** (a) The chalk and limestone ridges, being both composed of porous rock, are dry, and are therefore given up to sheep-rearing. (b) The valleys of more fertile clayey soil are devoted to mixed agriculture or dairy farming. Specially noteworthy from this point of view is the Vale of Aylesbury, which produces a large percentage of London's milk supply.

(c) *Wheat.*—The fairly heavy clay soil, along with the rather dry, sunny summers, makes the clay vales on each side of the scarps very suitable for wheat cultivation. The county of Wiltshire
n the average for the whole
; rapidly towards the north-
growing two or three times
as much wheat per acre as the average for the country. Other crops extensively grown along with wheat are oats, barley, and root crops.

3.—**Minerals.** (a) The chalk yields flint, which is often used as building stone, while a variety of chalk known as the

Totternhoe stone is extensively used for building in Hertfordshire and Cambridgeshire. Lime, cement, and whiting are also made from some kinds of chalk. Certain beds in the chalk also yield phosphates, which are spread on the fields as manure.

(*b*) The limestone scarp also yields excellent building stone at Portland and Bath. Cement is made at Portland. Iron ore is fairly extensively found along the line of the scarp, the chief districts where it is mined being Westbury in Wiltshire, Kettering, and Wellingborough.

4.—**Industries.** Though this is not typically an industrial area, some industrial activity obtains.

(*a*) The woollen industry, based originally on the local supplies of wool from the limestone and chalk uplands, still maintains itself in the " West of England " district, around Bradford, Stroud,

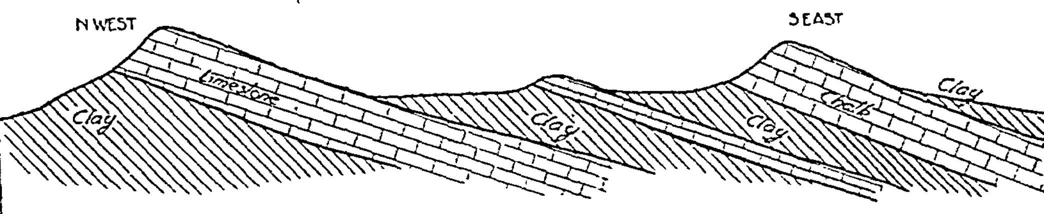


Fig. 11

and Trowbridge. Blankets are still manufactured at Witney in Oxfordshire.

(*b*) Two interesting survivals of ancient industries are the straw-hat making of Luton, and the furniture-making of High Wycombe, both on the south-eastern side of the chalk scarp. The former was based originally on local supplies and skilled labour ; the latter on the beech woods of the Chilterns. As the industries grew, both outstripped local supplies of raw material. Instead of moving the factories, however, raw materials were imported from abroad, and thus the industries continued. These are often quoted as examples of industrial momentum.

(*c*) Boots and shoes are manufactured at Northampton and Kettering, the industry being based originally on the ample supplies of hides (Northamptonshire has an average of one cow per 4½ acres, the average for Britain being one cow for 7 acres).

(*d*) Iron-smelting : Based on the local supplies of ore in the limestone scarps, smelting has been established at Westbury, Northampton, and Wellingborough.

5.—**Routes.** All the important routes of this area lead across the grain of the land, i.e. from London to the west and north-west, instead of running, as might be expected, parallel to the grain of the land, from south-west to north-east. Work out the following on the sketch-map and the atlas :—

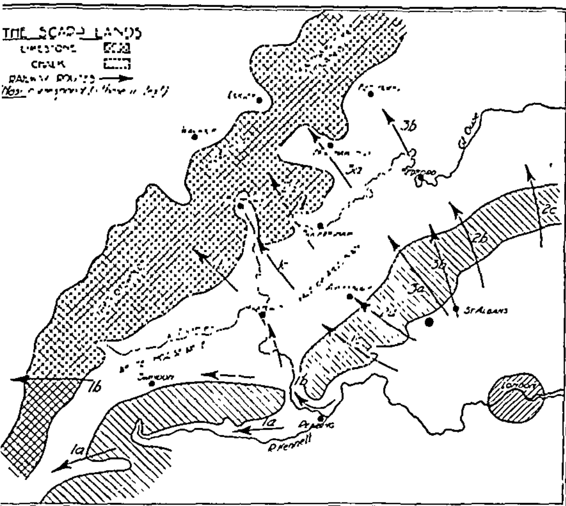


Fig 12

(1) *Great Western Routes.*—(*a*) From London, via Reading, up the Kennet valley to Frome and the west of England. (*b*) Via Reading, through the Thames water gap at Goring, to Didcot, whence one branch proceeds to Swindon, and via the Severn Tunnel to South Wales. The other branch goes through Oxford to Hereford and Chester. (*c*) From London through Uxbridge, thence by a dry gap in the Chilterns at Princes Risborough, across the Vale of Aylesbury to Banbury and Birmingham.

(2) *London and North-Eastern.*—(*a*) By the dry gap in the Chilterns at Wendover, thence to Aylesbury, and across the limestone scarp to Rugby. (*b*) Via Hitchin to Huntingdon, Peterborough, and the north. (*c*) Through Bishop Stortford and Saffron Walden to Cambridge.

(3) *London, Midland, and Scottish.*—(*a*) Past Watford, through the dry gap in the Chilterns at Tring, to Bletchley and Northampton. (*b*) Via St. Albans and Luton to Bedford and the north.

6.—**Town Sites.** (*a*) Swindon owes its importance to its position at the junction of railways from the west, and to the fact that it is the depot of the Great Western Railway for the manufacture and repair of rolling stock.

(*b*) Oxford grew up as a market town in the middle of the fertile Oxford Clay Vale, and at the confluence of the Cherwell and the Thames. It is, of course, world-famous for its University.

(*c*) Market towns like Aylesbury and Buckingham must develop in every fertile agricultural region for the convenience of exchange and purchase of farm produce, stock, and machinery.

(*d*) Other towns have grown up along the foot of the chalk and limestone ridges at places where they control gaps through those ridges.

Chapter III

EASTERN ENGLAND

(See Figure 13)

1.—**Structure and Physical Features.** In the Scarp Lands we have noticed four roughly parallel belts of country, viz.: (*a*) the London Clay, (*b*) the Chalk Scarp of the Chilterns, (*c*) the Oxford Clay Vale, (*d*) the Limestone Scarp of the Cotswolds. All these are continued in eastern England, in a somewhat modified form.

In East Anglia the London Clay is replaced on the coastal belt of Norfolk and Suffolk by a more recent series of deposits known as the Pliocene. The Chalk Scarp becomes lower and less definitely marked, and is overlain, in part, by boulder clay, which was deposited by glaciers which once covered all but the southern part of Britain.

In the Fen District the Oxford Clay is overlaid by mud, sand, and peat, which were deposited when this district was nearly all marsh and lagoon.

In Lincolnshire the Limestone Scarp is continued as the Lincolnshire Heights, or Lincoln Edge. The Chalk Scarp is continued as the Lincoln Wolds, the broad valley between them representing the continuation of the Oxford Clay Vale, while Lincoln Marsh, near the coast, represents the continuation of the Fenland.

In Eastern Yorkshire the Chalk is continued as a prominent ridge known as the Yorkshire Wolds, from the Humber to Flamborough Head. The Limestone Scarp is not found south of Malton, but reappears north of that town as the North York Moors and the Cleveland Hills. Between the moors and the wolds is the fertile Vale of Pickering, corresponding in position and structure to the Oxford Clay Vale. Between the wolds and the coast the low plain of Holderness is the counterpart of the Lincoln Marsh and the Norfolk coast-lands.

2.—**Coast-line.** The coast as a whole is characterised by smooth, even sweeps, unbroken by deep indentations. Where the hard rock of the escarpments comes to the coast, cliffs and headlands are formed, viz.: (*a*) On the north-eastern coast of

(2) *London and North-Eastern.*—(*a*) By the dry gap in the Chilterns at Wendover, thence to Aylesbury, and across the limestone scarp to Rugby. (*b*) Via Hitchin to Huntingdon, Peterborough, and the north. (*c*) Through Bishop Stortford and Saffron Walden to Cambridge.

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Yorkshire the Cleveland Hills and the North York Moors form the high cliffs about Whitby and Robin Hood's Bay. (*b*) Flamborough Head is the end of the Chalk Wolds. (*c*) On the northern coast of Norfolk the chalk forms a clified coast remarkable for its picturesque scenery.

Where the low land comes to the coast we have the low, even coast-line of Holderness, Lincolnshire, and the Wash. Note particularly that Spurn Head, though so prominent a feature on the map, is only a low spit of sand, deposited by the currents of the North Sea and the Humber.

The Broads of Norfolk are lakes formed by the damming up of the river mouths by sand-dunes and by mud deposited by the sea-currents. They are particularly numerous in the basin of the river Bure, and being shallow, picturesque, and well stocked with fish, they have become a popular holiday rendezvous, but are practically useless from an economic point of view.

The coast as a whole lacks good harbours. The Wash is too shallow for any but the smallest vessels. Yarmouth secures shelter from a sand-bank off the coast, the calm strait between being known as Yarmouth Roads. The Humber, however, forms a first-class entrance into the land, and here are situated the only important commercial ports on the whole coast—Hull, Grimsby, and Immingham.

3.—**Rivers.** These fall naturally into three groups: (*a*) The Humber system: note particularly the Derwent, rising near the east coast, then turning eastward and southward to drain the Vale of Pickering; the little river Hull, flowing through Beverley to Kingston-upon-Hull (the full name of the port). (*b*) The Witham rises on the western side of the Limestone Scarp, breaks through that range of hills at the Lincoln Gap, then continues to the Wash. (*c*) The rivers of the Wash—the Welland, Nen, and Great Ouse—all follow somewhat artificial courses, having been embanked and converted into drainage canals as part of the means adopted in the seventeenth and eighteenth centuries for the reclamation of the Fens. Note particularly the Old and New Bedford rivers, cutting off the large bend of the Great Ouse about Ely.

All the above rivers of eastern England are navigable for small boats.

In East Anglia the Yare gathers together the meandering rivers Bure and Wensum to discharge them at Yarmouth. The Waveney is another winding river which flows to Lowestoft, but also has a branch connecting it with the Yare a short distance from its mouth.

4.—**Climate.** The area under consideration is almost entirely enclosed by the 38° F. isotherm for January, while in July its

temperature is over 60° F. It is, therefore, more extreme than the rest of Britain; the reason being that it is farthest removed from the equalising effects of the westerly winds from the Atlantic. For the same reason the rainfall is low, the greater part of the area having less than 25 inches per year. Note on the rainfall map

Fig 13

how an increased elevation causes an increased rainfall—e.g. on the Lincoln Wolds, where it reaches over 30 inches. Another point of interest is that this area, like all the eastern half of England, has more rain in the summer half of the year than in the winter half.

5.—Agriculture. Sheep-rearing is characteristic of the limestone and chalk ridges in Lincolnshire and eastern Yorkshire. Cattle are kept in large numbers on the Lincolnshire marshes and

in the clayey lands around the Fens, while horses are the specialty of Holderness; but it is as an arable farming district that this region is most noteworthy. Wheat: All the counties included in this natural region, with the exception of the North Riding, produce much more wheat than the average for the British Isles, but the following districts and counties are specially noted: the Fens (particularly the divisions of Holland and the Isle of Ely), Norfolk, Essex, Huntingdonshire, Cambridgeshire, West Suffolk, Bedfordshire, and Hertfordshire. The fertile clay soil, the level land, the high summer temperatures, the dry climate, and the bright sunshine all combine to render wheat cultivation successful in this area. Barley is cultivated throughout, but more especially in Lincolnshire, and on the sandy soils of Norfolk. Oats are also widespread, being mainly cultivated as a food for horses. Potatoes are extensively cultivated, particularly in Lincolnshire and in the Fen District. Root crops, such as turnips, mangolds, and swedes, are grown as winter feed for cattle and sheep. An attempt is being made to introduce the growth of sugar beet, for which conditions of soil and climate are quite favourable. Mustard for seed is grown in East Anglia.

The system of rotation of crops is practised throughout the region. In this system exhaustion of the soil is prevented by sowing crops in rotation in successive years—e.g. wheat the first year, turnips the second, and barley the third.

6.—**Minerals.** The only mining regions are: (*a*) The Scunthorpe district of Lincolnshire, where iron ore is found in the limestone scarp. (*b*) The Cleveland Hills, where exists the chief deposit of iron ore in the British Isles. This will be dealt with in greater detail along with the industrial district of North-Eastern England. (*c*) Building stone of excellent quality is quarried at Lincoln and Ancaster. (*d*) Reported discoveries of coal at Lincoln will, if substantiated, be of tremendous importance in the future development of this area.

7.—**The Seaports.** Hull is usually ranked as the third port in Britain, but the value of its trade has of late years been equalled, and even outstripped, by Manchester. It owes its importance to the following facts: (*a*) It is on the only deep indentation of the coast between the Tees and the Thames. (*b*) It is the natural outlet for the coal and manufactured products of the large industrial area of the York, Derby, and Nottingham coalfield. (*c*) Similarly, it is the natural port of entry for the foodstuffs required by this dense area of population. (*d*) It is served by a network of canals, canalised rivers, and railways. Chief among the canals is the Aire and Calder navigation system. (*e*) It has a deep-water harbour, with ample berthing accommodation at the mouth of the river Hull. (*f*) It

is an important centre of the fishing industry. The outstanding feature of Hull's fisheries is that it is concerned mainly with distant fields—e.g. Iceland and the Norwegian fiords. The salting, curing, and packing of herrings is an important industry of the port. (g) Another characteristic industry is flour-milling, chiefly from imported flour.

The countries traded with are chiefly those whose coasts face it across the North Sea: i.e. Russia, Norway, Sweden, Germany, Holland, and Denmark; though Australia and South America send wool, and the latter receives much coal.

The chief imports are: wheat, from India, Russia, and Canada; wool, from Australia, South Africa, and Argentina; timber, from Russia and Sweden; butter and eggs, from Holland and Denmark; oil-seeds for crushing to make oil and cattle-cake; wood pulp for the making of paper, from Norway and Sweden.

The exports consist mainly of manufactured goods from the industrial area of the West Riding of Yorkshire, fish, and coal. The last-mentioned commodity is of increasing importance. The development of the new "hidden" coalfield of the Doncaster area, and the proposed tunnel under the Humber, will do much to add to the export of coal from Hull in the near future.

Goole, situated at the head of sea-navigation of the Humber, suffers from the fact that navigation of the upper Humber is impeded by sandbanks; but it has the advantage of being nearer the coalfield than Hull. It is the terminus of the Aire and Calder Navigation system of canals.

Grimsby surpasses Hull as a fishing port, and also competes with it in the export of coal and the import of timber and dairy produce.

Immingham, Grimsby's twin port, has been developed by the London and North-Eastern Railway, principally as a coal port,

local needs. Its imports are mainly foodstuffs such as sugar, barley, cattle-cake, maize, and timber. The exports are coal and coke.

King's Lynn, at the mouth of the Great Ouse, is strictly comparable in position, importance, and volume of trade to Boston, except that its export of coal and coke is much less in quantity.

Yarmouth and Lowestoft are primarily fishing ports, concerned chiefly with the herring industry, fish forming the greater bulk of the exports. Imports consist chiefly of corn, timber, cattle-cake, and building materials. Both towns are well known as holiday resorts.

Ipswich was formerly an important port, being situated at

the head of navigation of the Orwell. It still has some trade in the import of timber, grain, and fertilisers.

Harwich, situated on a small peninsula at the mouth of the Stour, has already been noted as a packet-station. It has also considerable imports of dairy produce, bacon, and perishable goods, which require quick transit, from the Continent.

8.—**Inland Towns.** Of these Lincoln is by far the most important. It controls the Witham gap in the Chalk scarp, and hence is a centre of radiating roads and railways. It was also the natural head of the navigation of the Witham, but sea-going ships cannot now reach the town. It has become an important iron-manufacturing town, depending in part on ore from the immediate locality and from Scunthorpe to the north. Being the centre of a large agricultural area, it is naturally a market town, and its factories specialise in the manufacture of agricultural implements.

Grantham, at the eastern foot of the Chalk scarp, also manufactures agricultural implements and machinery. Stamford, Peterborough, Huntingdon, and Cambridge grew up originally as small ports at the edge of the Fenland. They have, of course, entirely lost this character owing to the silting up of the rivers. Instead they have developed as market towns for the rich agricultural districts of which they are the centres.

Norwich occupies a central position in the fertile farming lands of East Anglia, is at the confluence of the Wensum and the Yare, and was the former port of this region. Its trade has been almost entirely captured by Yarmouth, but it still retains its importance as a market town, and also manufactures tools, ploughs, and other agricultural implements. Mustard is also prepared there, and high-class boots and shoes are manufactured.

9.—**Holiday Resorts.** These are situated wherever firm sands or picturesque cliffs combine with easy access from the dense populations of London, the Midlands, or the industrial North. Most noteworthy are Whitby, Scarborough, Skegness, and Cromer, though many others may be noted on the map.

Chapter IV

THE SOUTH-WESTERN PENINSULA

(See Figure 14)

1.—**Structure and Relief.** This natural division consists of the counties of Cornwall, Devon, Somerset, and part of Dorset. It consists almost entirely of high land, the chief masses, which should be carefully noted on the physical map, being:

(*a*) The Mendip Hills in Somerset, a range of hills composed mainly of limestone.

(*b*) The Polden Hills, running in roughly the same direction as the Mendips, but composed of Old Red Sandstone.

(*c*) The Quantock Hills, of similar structure.

(*d*) Exmoor, occupying the western angle of Somerset and the northern portion of Devon. This is composed chiefly of hard, old, slaty rock, and of Old Red Sandstone.

(*e*) The Blackdown Hills, on the borders of Somerset and Devon.

(*f*) Dartmoor, occupying the southern and central part of Devon. This is composed mainly of granite, which does not easily wear down to make good soil. Consequently it is a barren area, mainly occupied by moor and bog and rough pasture.

(*g*) *The more elevated areas of Cornwall, Bodmin Moor, the* St. Austell Mass, and the areas around the Lizard and Land's End *are also composed of granite.*

Note also the areas of low land, which, on account of their greater fertility, are of very great importance in the geography of the area. They are, from north to south: (*a*) the Plain of Somerset, an almost circular vale lying between the Mendips, the Dorset Heights, the Blackdown Hills, and Exmoor, (*b*) the Vale of Taunton, between Exmoor and the Blackdown Hills; (*c*) the Plain of Devon, between the two last-named hill-masses and Dartmoor; (*d*) the coastal areas round the mouths of the Cornish rivers.

2.—**Rivers.** The main drainage lines follow a north-west to south-east direction. (*a*) The Plain of Somerset is drained by the Axe, the Brue, and the Parrett; the Tone tributary of this last

the Vale of Taunton. (*b*) The Exe and its tributaries drain
ain of Devon to the south, while the Torridge and the Tawe
northward to Barnstaple Bay. On the border of Cornwall
Devon the Tamar drains the low land between Dartmoor and
min Moor.

3.—**Coast-line.** The rugged character of the coast is due to
ree factors. (*a*) The high land approaches very close to the
ast, as in northern Somerset, the Lizard, and Land's End.

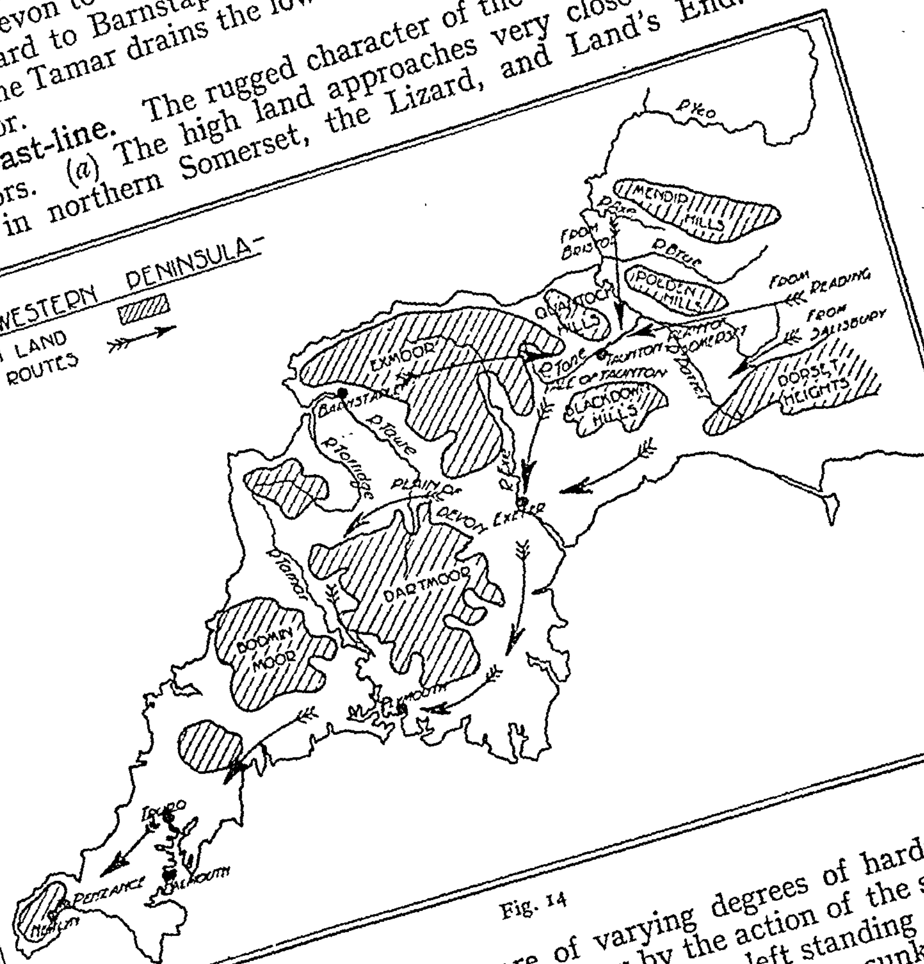


Fig. 14

(*b*) The rocks on the coast are of varying degrees of hardn
The softer rocks have been worn away by the action of the se
form inlets, while the harder rocks have been left standing o
peninsulas and headlands. (*c*) Parts of the coast have sunk
their former level, so that the sea has flowed into the lowe
of the river valleys, thus forming deep inlets such as th
Falmouth Harbour and Plymouth Sound.

4.—**Climate.** *Rainfall.*—Being directly in the trac
south-west winds, which are compelled to rise on encount
high land of the peninsula, this region has a rather heav
The following points should be noted, as illustrating

geographical principles: (*a*) The rainfall to the east, e.g. in the Plain of Somerset, is less than that on the west, e.g. in Cornwall. This is due to the lower elevation and the increasing distance from the sea. (*b*) The high lands of Dartmoor, Bodmin Moor, Exmoor, etc., receive heavier rainfall than the low lands. This is due to the air having to rise on encountering these high land masses; rising, the air cools, and the moisture in it therefore condenses.

Temperature.—(*a*) In summer the sea-level temperatures are between 60° F. and 62° F. on the average. (Note here the effect of latitude, making this region warmer than, for example, the north of Scotland.) (*b*) In winter the average temperature is about 44° F.—a small portion of the south-west of Cornwall having the warmest winters to be found in Britain. (*c*) The range of temperature is therefore only about 16° F. to 18° F. This is a remarkably equable climate.

The equability and raininess of the climate may both be attributed to the same cause, viz.: they are open to the full influence of the Atlantic Ocean, the westerly winds, and the Gulf Stream Drift, all of which combine to make the area cool in summer and very mild in winter.

(The above refers, of course, only to the low land. The high lands of Dartmoor and Exmoor have temperatures about 10° F. lower than those shown on the sea-level isotherm maps.)

5.—**Minerals.** (*a*) Copper and tin have been mined in Cornwall from the very earliest historic times. The copper is now almost exhausted. Tin is still worked on the borders of Bodmin Moor [illegible]

(*b*) Other metallic ores found in veins in Cornwall and Devon, often associated with the copper and tin, are tungsten, arsenic, and antimony.

(*c*) China clay, formed by the weathering of the granite of Dartmoor, Bodmin Moor, etc., is extensively quarried. It is shipped to the mouth of the Mersey, thence carried by barge-canal to the Potteries district of North Staffordshire.

(*d*) Granite. The granite of Dartmoor is a very handsome rock containing large crystals of white felspar and glistening masses of quartz. It is in great demand for the ornamental portions of public buildings, etc.

(*e*) Lime is obtained in the Mendip area by the burning of the limestone.

(*f*) Building stone is obtained from a variety of local rocks. Coarse slates are quarried on the northern edge of Exmoor.

6.—**Farming.** The high-land areas of Exmoor and Dartmoor are mainly waste lands, though even here a certain amount of rough pasture is available for sheep, hardy cattle, and shaggy-haired ponies. Dairy farming is the principal occupation on the moist, fertile low lands of Cornwall, and in the Plain of Devon and in the Vale of Taunton. Mixed agriculture, i.e. the cultivation of wheat, oats, barley, root crops, and hay on a system of rotation of crops, is extensively practised on the low lands, especially in the Vale of Taunton and the Plain of Somerset. Wheat is not grown very extensively, the moist climate being more suitable to the cultivation of other cereals.

Market gardening flourishes, especially in the mild, moist districts of Cornwall and the Scilly Isles. Here the early spring favours the cultivation of early flowers (e.g. daffodils and narcissi) and of early vegetables (e.g. potatoes), which find a ready and profitable market in London and the industrial districts of the Midlands and the North.

Fruit.—Around Exeter, Crediton, and Tiverton is a belt of New Red Sandstone, which is a much softer and more fertile soil than that of the Old Red Sandstone which makes up a great part of the South-Western Peninsula. This New Red Sandstone belt is particularly famed for the production of cider, the special drink of Devon and Somerset.

7.—**Fishing.** The numerous inlets on the coast have always tempted men to take to the sea. Mackerel and pilchards are the chief kinds of fish caught, though large quantities of lobsters are also trapped around the rocky shores.

8.—**Routes.** (*a*) The Great Western Railway enters this district via the Thames-Kennet route to Frome. Thence it crosses the Plain of Somerset between the Polden Hills and the Dorset Heights, proceeds via Taunton up the Vale of Taunton, between the Blackdown Hills and Exmoor, and down the Exe valley to Exeter. Thence it continues along the coastal plain of Devon, between Dartmoor and the coast to Plymouth, Truro, and Penzance.

(*b*) The old London and South-Western Railway (now the Southern Railway) enters the area from Salisbury, and runs through Yeovil and Honiton to Exeter. Thence it proceeds round the northern edge of Dartmoor, and approaches Plymouth from the north, via the valley of the Tamar.

9.—**Town Sites and Industries.** (*a*) Plymouth. This is the only large port of the region. It is situated on a fine land-locked harbour, and has good railway connection with London and the Midlands. It is a calling place for ocean liners, and deals with passengers and mails, but has little general commerce.

(*b*) Devonport, close by, is a great naval station.

(*c*) Falmouth, at the mouth of the small stream, the Fal, which flows into the magnificent estuary leading up to Truro, is important as a fishing centre; it also exports copper and tin, and is a subsidiary naval station.

(*d*) Exeter is at the centre of the converging routes of the Plain of Devon, and at the head of the estuary of the river Exe.

(*e*) Taunton is in the centre of a fertile agricultural district. From it routes radiate to (i) Reading and London, (ii) to Bridgwater, Weston-super-Mare, and Bristol, (iii) along the southern edge of Exmoor to Barnstaple, (iv) south-westward to Exeter.

(*f*) Honiton is noted for home-made lace, while (*g*) Yeovil is famed for gloves.

Holiday resorts, depending for their appeal on the beautiful scenery of coast and interior, and on the mildness of their winters, and the warm, sunny summer, may be enumerated by the dozen. The best known are Torquay and Ilfracombe.

Mining towns, such as Redruth and Truro in Cornwall, and small fishing ports such as Brixham and Newlyn, complete the list.

Chapter V

THE MIDLAND PLAIN

(See Figure 15)

1.—**Relief.** The so-called Midland Plain is in reality a low plateau with an average height of 300 feet above sea-level. The northern boundary of the plateau is formed by the southern edge of the Pennines; the western boundary is formed by the Welsh mountains, their extensions known as the Wrekin, Long Mynd, and the Clee Hills, and by the Malvern Hills; on the south-eastern side the Limestone scarp of the Cotswolds, the Northampton Uplands, and the Wolds of Leicestershire form a well-marked physical boundary.

The greater part of this area is formed of the rocks known as the New Red Sandstone. These are soft sandstones and clays, which have consequently been worn down to make relatively low land. Two important elevations mark the outcrop of harder rock: (*a*) the Charnwood Forest area in Leicestershire, which, being composed of rocks like granite and hard sandstones, makes an area of tangled hill and valley more like the scenery of Wales than the subdued topography of the New Red Plain around it; (*b*) the Clent Hill marks a somewhat similar belt of older rock.

In four areas Coal Measures are found, viz.: (i) North Staffordshire, (ii) South Staffordshire, (iii) Leicestershire, around Ashby-de-la-Zouch, (iv) Warwickshire, near Nuneaton. Where these coalfields occur they give rise to industrial life quite different from the life of the farming communities of the plain. These areas will therefore be dealt with separately.

2.—**Rivers.** The northern part of the plain is drained by the river Trent and its tributaries, the Tame flowing through Tamworth and the Soar flowing through Leicester and Loughborough. On the south the Avon, flowing through Warwick and Stratford-on-Avon, drains the fertile Vale of Evesham, and joins the Severn at Tewkesbury. This latter river forms approximately the western edge of the area. Its tributary the Stour flows from a district of slightly higher land near Birmingham.

In the north-western corner of the plain the Weaver and the Dee flow northward from a low watershed about Whitchurch.

The characteristic of the whole area is therefore one of easy gradients, with natural routes leading along the valleys of the above-mentioned streams.

3.—**Climate.** This area is transitional between the wetter,

Fig 15

more equable west and the drier, more extreme east. Its annual rainfall is between 25 and 30 inches, except where high land causes extra precipitation—e.g. in the Clent Hills and the Charnwood Forest area.

4.—**Farming.** The clays of the New Red Sandstone system make rich agriculture land, although the sandy areas are infertile. Consequently, mixed arable farming and dairy farming are carried

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The greater part of this area is formed of the rocks known as the New Red Sandstone. These are soft sandstones and clays, which have consequently been worn down to make relatively low land. Two important elevations mark the outcrop of harder rock: (*a*) the Charnwood Forest area in Leicestershire, which, being composed of rocks like granite and hard sandstones, makes an area of tangled hill and valley more like the scenery of Wales than the subdued topography of the New Red Plain around it; (*b*) the Clent Hill marks a somewhat similar belt of older rock.

In four areas Coal Measures are found, viz.: (i) North Staffordshire, (ii) South Staffordshire, (iii) Leicestershire, around Ashby-de-la-Zouch, (iv) Warwickshire, near Nuneaton. Where these coalfields occur they give rise to industrial life quite different from the life of the farming communities of the plain. These areas will therefore be dealt with separately.

2.—**Rivers.** The northern part of the plain is drained by the river Trent and its tributaries, the Tame flowing through Tamworth and the Soar flowing through Leicester and Loughborough. On the south the Avon, flowing through Warwick and Stratford-on-Avon, drains the fertile Vale of Evesham, and joins the Severn at Tewkesbury. This latter river forms approximately the western edge of the area. Its tributary the Stour flows from a district of slightly higher land near Birmingham.

In the north-western corner of the plain the Weaver and the Dee flow northward from a low watershed about Whitchurch.

The characteristic of the whole area is therefore one of easy gradients, with natural routes leading along the valleys of the above-mentioned streams.

3.—**Climate.** This area is transitional between the wetter,

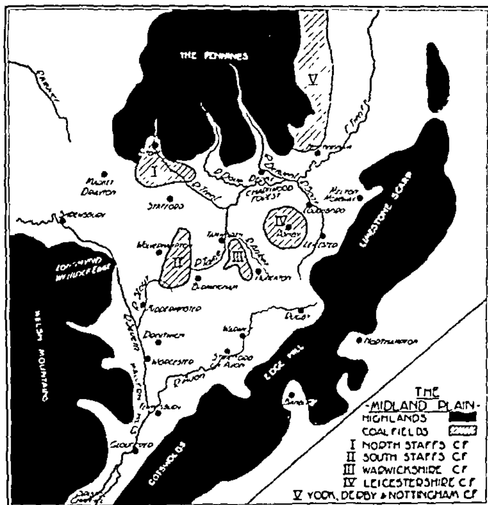


Fig 15

more equable west and the drier, more extreme east. Its annual rainfall is between 25 and 30 inches, except where high land causes extra precipitation—e.g. in the Clent Hills and the Charnwood Forest area.

4.—**Farming.** The clays of the New Red Sandstone system make rich agriculture land, although the sandy areas are infertile. Consequently, mixed arable farming and dairy farming are carried

on. Wheat is grown in considerable quantities, particularly in the counties of Warwickshire and Worcestershire. Barley, oats, root crops, and clover are also grown as part of the system of crop rotation. Cattle are reared to supply the demands of the industrial areas for milk, butter, and meat.

The Vale of Evesham is a noted fruit-growing area, producing large quantities of apples, pears, plums, etc.

THE COALFIELDS AND THE INDUSTRIAL AREAS

1.—**The South Staffordshire District.** Here a ring of towns on the coalfield west of Birmingham specialise in various branches of metal manufacturing. Coal and iron are found in close proximity, and facilities for transport are offered by a network of roads, canals, and railways centring on Birmingham. A feature of this district is the specialisation of particular towns in certain branches of manufacture. Thus Birmingham specialises in nails and screws, pins and needles, cycles and motor cars, etc. Walsall is noted for locks and saddlery; Cradley Heath for chains.

The concentration of smoke from the collieries, blast furnaces, and engineering shops has earned for this region the title of the Black Country. The dinginess is further emphasised by the blue bricks which are a specialty of the area. Fire-bricks are made at Stourbridge.

2.—**The Potteries.** The coalfield of North Staffordshire specialises in the manufacture of all kinds of porcelain and earthenware. Local Coal Measure clays are used as the basis of the industry, but the finer materials (e.g. China clay) have to be imported from other parts of Britain. The chief towns engaged in the pottery industry are: Stoke, Burslem, Hanley, Longton, and Newcastle-under-Lyme. This district was therefore formerly known as "The Five Towns," but this is now a misnomer, as the five towns have been amalgamated to form Stoke-on-Trent.

3.—**The Warwickshire Coalfield.** This occupies the angle between the Tame and its tributary the Anker, and stretches from Tamworth to Nuneaton. It is not productive enough to support any large industry, though the boot and shoe industry of Nuneaton is important. Further south, Coventry, though not on the coalfield, specialises in the manufacture of motors and bicycles.

4.—**The Leicestershire Coalfield** is unable to supply more than the ordinary needs of the locality. Consequently no great industry has grown up there. Ashby-de-la-Zouch is the coal-mining centre. Loughborough, on the Soar, is noted for engineering and the manufacture of motor buses.

OTHER INDUSTRIES

1.—**Salt Mining.** Salt is found among the New Red Sandstone rocks, and is obtained by pumping out the brine in Cheshire and Worcestershire. Important centres are Nantwich and Droitwich.

2.—**Gypsum.** This mineral is found in veins among the clays of the New Red Sandstone, chiefly in the valley of the Trent. It is used for the manufacture of plaster-of-Paris.

3.—**Beer** is brewed at Burton-on-Trent. The water here contains gypsum, which makes it very suitable for brewing. The district around grows a good deal of barley for malting.

4.—**Road Metal** is obtained from the hard, old, crystalline rocks of Charnwood Forest and Mount Sorrel, both in Leicestershire.

5.—**Hosiery.** Leicester, at the foot of the Limestone scarp, specialises in the manufacture of machine-knitted goods. Probably the origin of the industry is to be traced to the local supplies of wool from the limestone hills, though now most of the wool is imported, and many articles are made of cotton.

6.—**Boots and Shoes.** Stafford, Nuneaton, and Leicester all have important boot and shoe manufactures. The industry originally grew up on the local supplies of hides from the cattle reared on the fertile New Red Plain.

THE LANCASHIRE AND CHESHIRE PLAIN

This region lies between the Pennines on the east, the Welsh mountains and the Irish Sea on the west, and Morecambe Bay on the north. It is bounded on the south by a slight rise of the ground to an elevation of about 300 feet around Whitchurch. The area belongs by position to northern England. The region round the Mersey, moreover, has an industrial character which links it with the industrial area of south-east Lancashire From the points of view of geology, agriculture, and relief, however, it belongs more to the Midland Plain. Discussion of the industrial and commercial aspects of the plain will therefore be included with the section on the Lancashire coalfield. The student should carefully note, therefore, that for a full account of the area he should refer also to pages 51 to 53.

1.—**Relief and Drainage.** Almost the whole of this area is very low land, under 200 feet above sea-level. At the northern end the high land comes close to the coast, leaving only a narrow gap about Lancaster. At the southern end, south of Crewe, spurs from the Pennines and the Cambrian Mountains enclose a

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low-land gap, known as the Midland Gate. On the western side a narrow coastal plain leads to Holyhead.

Rivers which drain this area: The Dee, which rises near Dolgelly, emerges from the high land of Wales by the beautiful Vale of Llangollen, then turns northward via Chester, to enter the sea by the wide, shallow estuary of the Dee.

The Weaver flows from the low watershed of the Midland Gate, through Northwich to the Mersey estuary. The Mersey rises in the Pennines and flows westward across the plain in its widest part. The northern angle of the plain is drained by the lower courses of the Ribble, Wyre, and Lune.

2.—**Climate.** So far as both rainfall and temperature are concerned this region is transitional between the drier, more extreme climate of the Midlands and the east, and the wetter, more equable west. Note, for example, how a wedge of drier climate, with rainfall of from 25 to 30 inches, extends from the Midland Plain through Cheshire to the estuary of the Dee. This relative dryness is due to the sheltering effect of the Welsh mountains.

3.—**Farming.** Here again the Western Plain is transitional in character between the east and the west. The extension of the New Red Sandstone of the Midlands through Cheshire and the low land of Lancashire gives it fertile soil. The area is therefore an agricultural one. The climate is, however, rather more moist than that of the typical agricultural districts, hence there is a great dairy-farming industry. *Wheat.*—The plain as a whole grows only about half as much wheat as the average for the whole of the country. This is because the damper, cooler, more cloudy summers do not enable wheat to be ripened with such certainty as in the east of England. *Oats,* however, exceed the average for England by about 50 per cent. This is because oats flourish best in a rather damp, fairly cool climate. *Potatoes.*—The soil and climate have proved remarkably suited to the growth of this crop. Lancashire has more than four times as much land devoted to potatoes, in proportion to its size, as the rest of England. Cheshire has three times as much. *Beet.*—Efforts are at present being made to encourage the growth of sugar beet in this area. Conditions of soil and climate make it eminently suitable for the experiment.

Cattle.—These are about twice as numerous in Cheshire as for the average for the country, and the portion of Lancashire which falls within the plain has an equally dense distribution of cattle. The mild, moist winds from the sea encourage the growth of luxuriant grass, consequently there is much more pasturage, and less feeding upon root crops (turnips, mangolds, etc.) and clover, than in the cattle-rearing districts of the east.

Sheep.—This region is *not* a sheep-rearing area. Some sheep

are, of course, kept, but the average for Cheshire is only about one for eleven acres, whereas the average for Lincolnshire is about one for three acres. The reason is that whereas Lincolnshire has high, dry limestone and chalk hills, Cheshire is mainly composed of low, fertile land, more suitable for agriculture and dairy farming.

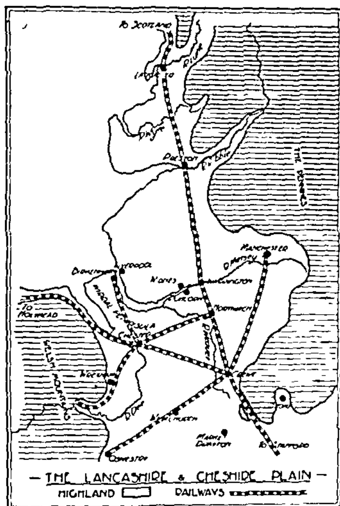


Fig 16

4.—**Salt.** The basin of the Weaver around Northwich and Middlewich is the greatest salt-mining area in Britain. Most of the salt, apart from that refined for domestic use, is sent to the estuary of the Mersey, where it forms the basis of the chemical industry around Runcorn, Widnes, and St. Helens (see page 53). Another area of salt mining, only developed in recent years, is that of Preesall, near Fleetwood.

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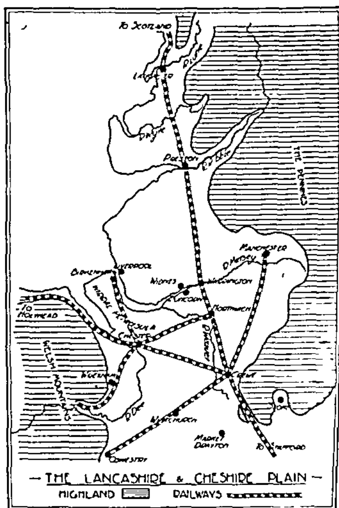


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5.—**Routes and Town Sites.** Crewe, which controls the Midland Gate, is the great railway centre of this region. From it routes radiate to (*a*) the Potteries, Stafford, and London; (*b*) to Nantwich and Oswestry; (*c*) to Chester; (*d*) to Warrington and the north; (*e*) to Stockport and Manchester. (NOTE.—The student should carefully follow out these routes on the map of England. See also the sketch-map, Fig. 16.) Chester, situated at the head of the shallow estuary of the Dee, was formerly an important port. It is, however, now useless except for small boats. It has recovered some of its early importance since the introduction of railways. From it routes radiate to (*a*) Holyhead, via the coastal plain of North Wales; (*b*) through Wrexham and the Vale of Llangollen to Dolgelly and Barmouth; (*c*) to Crewe; (*d*) to Manchester; (*e*) to Birkenhead.

Ormskirk, in the middle of the Lancashire Plain, is a market town, and the centre of a notable potato-growing district.

Where the main route from south to north crosses the rivers Mersey, Ribble, and Lune, are situated the ancient towns of Warrington, Preston, and Lancaster. The two former have become industrialised, and their description belongs more to the section on the Lancashire coalfield. The last, however, still retains much of its early picturesqueness. Its importance as a gateway town is reflected in the fine castle, which still exists.

Holiday Resorts.—These have grown up on the basis of the demand for them on the part of the huge industrial population of East Lancashire. The best known are Blackpool, St. Anne's, Lytham, and Southport on the estuary of the Ribble, and New Brighton on the Wirral peninsula.

THE VALE OF TRENT AND THE PLAIN OF YORK

Comparison with the Lancashire and Cheshire Plain. The following comparisons will serve the double purpose of indicating the chief points of geographical importance and, at the same time, providing opportunity for a thoughtful revision of the work on the plain of Lancashire and Cheshire. Such exercises as this frequently form the subject of examination questions.

1.—**Position.** (*a*) The plains lie respectively to the east and to the west of the Pennines. (*b*) Whereas the Lancashire Plain is open to the sea on the west, the Plain of York is flanked on the east by the North York moors, the Yorkshire wolds, and the Lincolnshire heights. (*c*) In the Plain of the Ouse and Trent, the more difficult physical barriers (e.g. York moors) are at the northern end; in the Lancashire and Cheshire Plain the physical barrier of the Welsh mountains is at the southern end. (*d*) Both

plains narrow to the north, the Yorkshire Plain to a gap at Northallerton, the Lancashire Plain to the coastal gap at Lancaster. (*c*) Both provide easy access to the Midlands, via the Midland Gate in Cheshire and the Trent Gate in Nottinghamshire.

2.—**Rocks.** (*a*) Both are formed of extensions of the New Red Sandstone rocks of the Midland Plain. In the Vale of York, however, this is overlaid by recent deposits of mud brought down by the Ouse and its tributaries.

(*b*) The eastern plain is flanked by the coalfield and industrial areas of York, Derby, and Nottingham, just as the Lancashire Plain is flanked by the coalfield and manufacturing area of south-east Lancashire.

3.—**Rivers.** While the western plain is drained by several rivers, which cross it from east to west, the rivers of the eastern plain are gathered together in one estuary; the Ouse, with its tributaries Swale, Ure, Nidd, and Derwent, flowing from north to south, the Trent flowing along the plain from the south. The rivers Aire and Calder may be taken as the counterparts of the Mersey, just as the Humber may be likened in position and importance to the estuary of the Mersey.

4.—**Climate.** The rainfall map (see Fig. 2) shows that the eastern plain, being in the shelter of the Pennines, is much drier than the western plain. The eastern plain is also more extreme, having warmer summers and colder winters than the west.

5.—**Farming.** Both areas are rich agricultural districts. In the Vale of York the dry, sunny summers encourage the cultivation of wheat, which is consequently much more important here than on the western plain.

Cattle-rearing is also practised, particularly in the rather damp areas of the Trent valley, and by the rivers of the Ouse basin. In this respect the area is very similar to Cheshire. Mixed agriculture is also carried on. Sheep are not of great importance in either area.

6.—**Minerals.** No salt is mined in the eastern plain, but gypsum is quarried in the valley of the Trent below Nottingham. The coalfield of York, Derby, and Nottingham extends underneath the newer rock between the rivers Aire and Trent. The exploitation of this coalfield will cause vast changes in the character of the area around Worksop and Doncaster in the near future. Iron is mined at Scunthorpe in the Limestone scarp which forms the eastern edge of the area.

7.—**Bog-land.** The low-lying land near the junction of the Ouse and the Aire was formerly waste marsh-land. Much of it has now been drained, but fairly large areas of fen-like land are

still to be seen east of Doncaster. Another " Fenland " area was the Isle of Axholme, near where the Trent joins the Humber. This, too, has been drained, and forms some of the most fertile land in the country, great crops of potatoes, vegetables, and wheat being obtained.

These areas of former marsh-land compare with the similar areas known as " mosses " in the Mersey valley (e.g. Chat Moss), which have been reclaimed, partly by filling up and partly by drainage.

ROUTES AND TOWN SITES

York. This is the natural centre, not only of the fertile plain, but also of routes down the rivers. It is also the tidal limit of the Ouse. For these reasons it was chosen by the Romans as their chief camp in the north. From it the Roman roads, as well as modern roads and railways, radiate in all directions. Note on the map the following lines of railway from York :—

(*a*) The East Coast route, via Thirsk and Northallerton to Darlington, Newcastle, Berwick, and Scotland.

(*b*) The continuation of the same route to the south via two main lines—one through Pontefract and Rotherham, and a second through Doncaster and Newark.

(*c*) The line to Scarborough, up the Vale of Pickering.

(*d*) To Hull on the southern side of the Wolds.

(*e*) To Leeds and the industrial area of the West Riding of Yorkshire.

In spite of this advantage as the centre of routes, York has not become an important manufacturing centre, for it is off the coalfield.

Selby, on the river Ouse, is a market town, and has an industry in the building of small ships.

Malton is the market town and milling centre for the rich agricultural region of the Vale of Pickering.

Harrogate is an inland watering-place, famous for its curative springs. Knaresborough, near by, on the Nidd, is primarily an agricultural market town.

Pontefract, though not on the Aire, probably controlled the bridge which in olden times carried the road to York (Latin *pons*= bridge). Similarly Doncaster was the castle at the bridge-place of the Don. The former town is already the centre of a coal-mining area, while Doncaster is becoming more and more industrialised as the seams of coal deep down under the New Red Sandstone are being exploited.

Worksop is another town in which a similar change is taking

place. The district to the south and east of it is known as the "Dukeries," and is far famed for its stately mansions and forest glades, the latter being the remnant of the famous *Sherwood* Forest.

In the Vale of Trent, Newark and Gainsborough are the chief towns. Both grew up as typical agricultural market towns, the former at a bridge-place on the Trent, the latter at the tidal limit of the Trent. Newark has, however, developed some industries, notably brewing and engineering.

PACKET STATIONS ON THE EAST AND SOUTH COASTS

The following tables give the chief packet stations for the Continent of Europe, along with the ports traded with and the distances. All the places mentioned should be found on the appropriate maps.

I. North Sea Ports

English Port	Foreign Port	Country	Distance
Newcastle	Bergen	Norway	410 miles
"	Gothenberg	Sweden	480 "
"	Hamburg	Germany	435 "
Hull and Grimsby	Copenhagen	Denmark	600 "
	Hamburg	Germany	386 "
	Rotterdam	Holland	215 "
Harwich	Rotterdam	Holland	122 "
"	Hook of Holland	Holland	106 "
"	Ostend	Belgium	130 "
"	Zeebrugge	Belgium	130 "
Queenborough	Amsterdam	Holland	200 "
"	Rotterdam	Holland	188 "

II. Channel Ports

English Port	Foreign Port	Country	Distance
Dover	Calais	France	22 miles
Folkestone	Boulogne	France	26 "
Newhaven	Dieppe	France	67 "
Southampton	Havre	France	114 "

Chapter VI

NORTHERN ENGLAND

(See Figure 17)

THE PENNINES

1.—**Position and Boundaries.** The Pennines are usually spoken of as a "range" or "chain." They are, however, more correctly described as a belt of high land from 600 feet to 2500 feet above sea-level, stretching from the Scottish border to latitude 53° N. At the northern end they merge gradually into the Cheviots; on the east the edge of the high land forms an approximately north-to-south line about longitude 1° 75′ west of Greenwich. On the west they are bounded by the Eden Vale, the saddle of high land about Shap Fell which connects the Pennines to the Lake District mountains, and, farther south, by the Lancashire and Cheshire plain. Note, on this western side, the two "bulges" of the Bowland Forest and Rossendale Forest. On the south the roughly semi-circular course of the Trent above Nottingham marks the approximate boundary of the Pennines.

2.—**Subdivisions and Rivers.** (*a*) *The North Pennines.* These are usually described as stretching from the river Tyne to the river Aire. The high land between the Tyne and the border, however, from a structural point of view, belongs rather to the Pennines than to the Cheviots. The rivers in this section all drain to the east, as the highest land is right on the western edge of the mountains, forming a steep escarpment overlooking the Vale of Eden. The courses of the following streams should be carefully noted: The Aln, the Coquet, the Wansbeck, and the Blyth, a series of short rivers flowing eastward from the most northerly portion of the Pennines. The Tyne, making a deep gap in the hills, below 500 feet in height, leading directly from Newcastle to the river Irthing, which drains to the Eden near Carlisle. The river Wear, rising at Kilhope Law (1206 feet), near the boundaries of Cumberland, Northumberland, and Durham, flows south-eastward through the deep valley of Weardale to Bishop Auckland, where it turns north-eastward, past Durham, to enter the sea at Sunderland. The river Tees flows in a roughly parallel course, and forms the

boundary between Yorkshire and Durham. After flowing past Barnard Castle, Darlington, and Stockton, it enters the sea at Middlesbrough. The river Eden forms a deep trench on the western edge of the Pennines, leading down through Appleby to Carlisle.

The following peaks should be noted in this section: Cross Fell (2892 feet), the highest point in the Pennines; and Mickle Fell (2591 feet), near the source of the Tees.

South of the Tees there is a marked change in the character of the drainage. The rivers Swale, Ure, Nidd, Wharf, and Aire are gathered together on the plain of York, where they join the river Ouse. On the western side the Lune and the Ribble flow to the Irish Sea, enclosing between them (i) the high land in which lie Whernside (2414 feet) and Ingleborough (2373 feet), and (ii) the circular mass of the Bowland Forest.

The river Aire here makes a deep valley, known as the Aire Gap, or the Craven Gap, leading up from Leeds through Skipton to Settle. This gap is usually taken as the southern limit of the north Pennines.

(*b*) *The South Pennines* are drained on the east by the Aire, Calder, and Don, flowing to the Ouse; to the south by the Derwent and Dove, tributaries of the Trent; and to the west by the Mersey and by tributaries of the Weaver. On the borders between Lancashire and Yorkshire the Pennines are at their narrowest, though farther south they widen out again in the Peak district of Derbyshire (note Kinder Scout, 2086 feet).

3.—**Farming.** (*a*) *Sheep.* In the northern Pennines, between the Aire Gap and the Cheviots, much of the surface is formed by the Carboniferous Limestone. This allows water to soak through it, and does not weather down to make good soil. It is a high plateau, largely bare of grass, though here and there are patches of scanty pasture. The region is therefore mainly devoted to sheep-rearing.

The northern half of the southern Pennines, between Glossop and the Aire Gap, is composed mainly of a kind of sandstone known as Millstone Grit. This is usually covered by heather, coarse grass, and swamp, or with an accumulation of decayed vegetable matter known as "peat." The land is of little economic use, and is largely giv ... gh a few sheep are also reared. ... disappears, and the limestone aga ... nd is again devoted mainly to sheep-rearing.

(*b*) *Cattle.* Dairy farming and cattle-rearing are carried on in the Pennine valleys and on the lower hill slopes. Particularly important in this respect are the Craven district, drained by

Chapter VI

NORTHERN ENGLAND

(See Figure 17)

THE PENNINES

1.—**Position and Boundaries.** The Pennines are usually spoken of as a "range" or "chain." They are, however, more correctly described as a belt of high land from 600 feet to 2500 feet above sea-level, stretching from the Scottish border to latitude 53° N. At the northern end they merge gradually into the Cheviots; on the east the edge of the high land forms an approximately north-to-south line about longitude 1° 75′ west of Greenwich. On the west they are bounded by the Eden Vale, the saddle of high land about Shap Fell which connects the Pennines to the Lake District mountains, and, farther south, by the Lancashire and Cheshire plain. Note, on this western side, the two "bulges" of the Bowland Forest and Rossendale Forest. On the south the roughly semi-circular course of the Trent above Nottingham marks the approximate boundary of the Pennines.

2.—**Subdivisions and Rivers.** (*a*) *The North Pennines.* These are usually described as stretching from the river Tyne to the river Aire. The high land between the Tyne and the border, however, from a structural point of view, belongs rather to the Pennines than to the Cheviots. The rivers in this section all drain to the east, as the highest land is right on the western edge of the mountains, forming a steep escarpment overlooking the Vale of Eden. The courses of the following streams should be carefully noted: The Aln, the Coquet, the Wansbeck, and the Blyth, a series of short rivers flowing eastward from the most northerly portion of the Pennines. The Tyne, making a deep gap in the hills, below 500 feet in height, leading directly from Newcastle to the river Irthing, which drains to the Eden near Carlisle. The river Wear, rising at Kilhope Law (1206 feet), near the boundaries of Cumberland, Northumberland, and Durham, flows south-eastward through the deep valley of Weardale to Bishop Auckland, where it turns north-eastward, past Durham, to enter the sea at Sunderland. The river Tees flows in a roughly parallel course, and forms the

boundary between Yorkshire and Durham. After flowing past Barnard Castle, Darlington, and Stockton, it enters the sea at Middlesbrough. The river Eden forms a deep trench on the western edge of the Pennines, leading down through Appleby to Carlisle.

The following peaks should be noted in this section: Cross Fell (2892 feet), the highest point in the Pennines; and Mickle Fell (2591 feet), near the source of the Tees.

South of the Tees there is a marked change in the character of the drainage. The rivers Swale, Ure, Nidd, Wharf, and Aire are gathered together on the plain of York, where they join the river Ouse. On the western side the Lune and the Ribble flow to the Irish Sea, enclosing between them (i) the high land in which lie Whernside (2414 feet) and Ingleborough (2373 feet), and (ii) the circular mass of the Bowland Forest.

The river Aire here makes a deep valley, known as the Aire Gap, or the Craven Gap, leading up from Leeds through Skipton to Settle. This gap is usually taken as the southern limit of the north Pennines.

(*b*) *The South Pennines* are drained on the east by the Aire, Calder, and Don, flowing to the Ouse; to the south by the Derwent and Dove, tributaries of the Trent; and to the west by the Mersey and by tributaries of the Weaver. On the borders between Lancashire and Yorkshire the Pennines are at their narrowest, though farther south they widen out again in the Peak district of Derbyshire (note Kinder Scout, 2086 feet).

3.—**Farming.** (*a*) *Sheep.* In the northern Pennines, between the Aire Gap and the Cheviots, much of the surface is formed by the Carboniferous Limestone. This allows water to soak through it, and does not weather down to make good soil. It is a high plateau, largely bare of grass, though here and there are patches of scanty pasture. The region is therefore mainly devoted to sheep-rearing.

The northern half of the southern Pennines, between Glossop and the Aire Gap, is composed mainly of a kind of sandstone known as Millstone Grit. This is usually covered by heather, coarse grass, and swamp, or with an accumulation of decayed vegetable matter known as "peat." The land is of little economic use, and is largely giv [illegible] gh a few sheep are also reared. [illegible] disappears, and the limestone aga[illegible] nd is again devoted mainly to sheep-rearing.

(*b*) *Cattle.* Dairy farming and cattle-rearing are carried on in the Pennine valleys and on the lower hill slopes. Particularly important in this respect are the Craven district, drained by

the river Aire, where fertile alluvial lowland alongside the rivers provides rich pasturage; and the valleys leading down to the Aire, Calder, Don, Ribble, and Mersey. In the case of these valleys the climate is too humid for the growth of corn, and the great demand of the dense population of the industrial districts of Lancashire and Yorkshire makes dairying (the supply of milk, cream, and butter) the most profitable type of farming.

(*c*) *Cereals*. These are not much cultivated within the area. There is a very low percentage of arable (i.e. ploughed) land, and consequently no system of rotation of crops such as is practised in the south and east of England.

4.—**Mining and Quarrying.** (*a*) *Lime* is obtained from the limestone of both the northern and southern extremities of the Pennines. Particularly noteworthy are the districts round Horton-in-Ribblesdale, Clitheroe, and Buxton.

(*b*) *Lead* was mined in Roman times, if not earlier, in the limestone districts of both the north and south Pennines. The principal districts were those about Ingleton, near the head of Wharfedale, and at various places in Derbyshire. Though the veins are not worked out, the supply of ore from these sources is now very small.

(*c*) *Fluor spar* is obtained in the valley of the Wear and in Derbyshire.

(*d*) *Barytes* or *heavy spar*, used in the manufacture of glass, is obtained from Derbyshire.

(*e*) *Building stone*. The local stone, whether limestone or sandstone, is used throughout the region, except where, on the margin of the low lands, the presence of brick-clay makes bricks more easily obtainable.

The millstone grit makes excellent building stone. Halifax and Brighouse are particularly noted for the fine, even texture of their sandstone, which is in great demand all over the industrial north.

In the district around Penistone, as well as at Hipperholme, near Halifax, excellent flagstones are quarried.

5.—**Railway Routes.** There are eight railway routes across the Pennines, of which all but two are of great importance. The routes, which should be traced out on the map (see pages 12 and 13 of the Atlas, and the sketch-map, Fig. 17), are, from north to south:—

(1) The one following the Tyne Gap, from Newcastle to Carlisle.

(2) Up the Tees valley to Barnard Castle, thence up the river Greta (a tributary of the Tees), and over the high divide and down into the Eden valley at Kirkby Stephen.

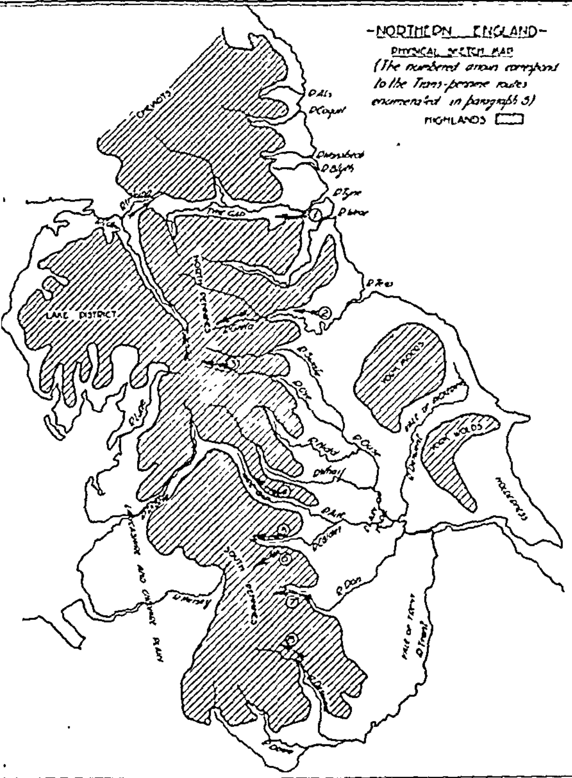

-NORTHERN ENGLAND-
PHYSICAL SKETCH MAP
(The numbered arrows correspond to the Trans-pennine routes enumerated in paragraph 3)
HIGHLANDS
CHEVIOTS
LAKE DISTRICT
TYNE GAP
NORTH PENNINES
SOUTH PENNINES
YORK MOORS
YORK WOLDS
VALE OF PICKERING
HOLDERNESS
VALE OF TRENT
R. Don
R. Trent
R. Mersey
LANCASHIRE AND CHESHIRE PLAIN

Fig. 17

(3) From Northallerton, up the valley of the Ure (Wensleydale), via Askrigg and Hawes, to join the main line from Settle to Carlisle. Neither of the two last-named routes is of great importance, as their gradients are difficult and they do not connect any great centres of population.

(4) By the Aire Gap from Leeds, through Keighley to Skipton, at which place it is joined by a line from East Lancashire, via Burnley, Nelson, and Colne. Thence the railway runs to Settle and along the upper valley of the Ribble to Hawes Junction, and thence down the Eden valley to Carlisle. An important branch line runs from near Settle to Lancaster.

(5) From Leeds and Wakefield, up the Calder valley to Todmorden. Here the line divides, one going through the Cliviger Gorge to Burnley, the other through the Walsden valley to Littleborough, Rochdale, and Manchester. This is probably the busiest line of the trans-Pennine railways. It was the main line of the former Lancashire and Yorkshire Railway.

(6) From Brighouse on the last-named line a railway runs up the Colne valley tributary of the Calder, through Huddersfield, and over the Pennines by the Standedge Tunnel to Manchester.

(7) From Sheffield, up the river Don to Penistone, thence across the Pennines by the Woodhead Tunnel, and down the valley of the Etherow tributary of the Mersey to Manchester.

(8) From Derby, up the valley of the Derwent through Bakewell and Buxton to Manchester. A line from Sheffield joins this route near Chapel-en-le-Frith.

THE COALFIELDS AND INDUSTRIAL DISTRICTS

On each side of the Pennines are great coalfields. In the south the coalfields of (*a*) *Yorkshire, Derbyshire, and Nottingham,* and (*b*) *South Lancashire,* are strictly comparable in position and importance. In the north the *Northumberland and Durham* coalfield corresponds in position with, though it is vastly more important than, the *Cumberland* coalfield on the western edge of the Lake District mountains.

In each of these coalfields the rocks are bent into a shallow basin, and the seams of coal usually come to the surface (i.e. "outcrop") on the edge of the high land. It was on these "outcrops" that coal-mining first commenced. Later, however, as deeper mines became practicable, the seams were tapped by deep shafts sunk through the plains on the east and west of the Pennines. Thus there has been a gradual extension of the area of coal-mining. This extension is most marked to-day on the eastern side of the Yorkshire coalfield, round the Doncaster district.

the greater part of the wool being imported via London. Recently, however, great efforts have been made to encourage the direct importation of wool from Australia to Hull.

A feature of the woollen industry in the West Riding is the specialisation of certain towns in particular processes of manufacture.

Bradford, on a small northward-flowing tributary of the river Aire, is the centre and market for the industry. Here are the great warehouses, the offices, and the Exchange, where wool-merchants, agents, manufacturers, dyers, etc., meet to arrange business. The factories here and in the surrounding ring of small towns specialise in the manufacture of worsteds, in which the fibres are "combed" before being spun, so that in the resulting product all the fibres lie parallel to each other. Other specialities are the manufacture of mohair and the dyeing of yarn and cloth.

Leeds specialises in the manufacture of good-quality cloths, and in the "making-up" trade. It has the greatest "ready-made" clothing trade in the world. Though a much larger town than Bradford, it is not specifically a woollen town, having large manufactures of leather and boots and shoes, as well as blast furnaces and much general engineering.

Halifax specialises in the manufacture of carpets and blankets, as well as in ordinary woollens.

Dewsbury and Batley manufacture "shoddy"; that is, cloth re-made from rags. Also associated with this branch of the industry is the line of small towns in the Spen valley (a tributary of the Calder), viz. Heckmondwike, Cleckheaton, and Liversedge.

Huddersfield, in the Colne valley, specialises in the manufacture of worsteds and high-class woollens, though the smaller towns of the Colne valley are devoted largely to the manufacture of "shoddy."

Keighley, in the valley of the Aire, although a woollen-weaving town, specialises chiefly in the manufacture of looms for weaving and machines for spinning.

Skipton, a few miles farther up the river Aire, though in the West Riding, is more of a cotton-manufacturing town than a woollen centre. Its speciality is cotton thread.

Saltaire, near Bradford, specialises in the manufacture of "mercerised" material, which has a silky sheen. Of recent years there has been a notable development of the artificial-silk industry in the Bradford district.

(2) *The Central Part* of the coalfield, around Barnsley, is noted more for its coal-mining than for industries supported by the coal. In fact, much of the coal is sent to other districts, either for household or factory use, or as coke for iron-smelting; while a great

deal is exported from the Humber ports of Hull, Goole, Grimsby, and Immingham. Barnsley itself was formerly noted for the manufacture of linen, but this industry has almost died out. There are, however, large paper and glass factories, as well as many miscellaneous industries.

(3) *The Sheffield District* has for many centuries been noted for its cutlery industry. Though it still holds the premier place in the world in this particular branch of the industry, it has of late years specialised also in the manufacture of special high-grade steels. These are really alloys in which some other metal is added to the iron. Thus stainless steel is made by an admixture of one-eighth chromium. If manganese be added to the steel, the resulting alloy is very durable. Tungsten steel is specially useful for the manufacture of magnets, and so on.

Much of the iron used is imported as pure pig-iron from Sweden, though much also comes from the iron mines of Scunthorpe and Frodingham in Lincolnshire.

Rotherham is an important coal-mining and iron-smelting town situated on the banks of the river Don below Sheffield.

Doncaster also belongs to this industrial region. Being a railway centre, near the coal and iron, it has specialised in railway engineering. Of late years many miscellaneous industries have grown up there.

(4) Further south, in Derbyshire and the east Notts area, are the towns of Chesterfield, Alfreton, Stanton, Clay Cross, etc., which have numerous blast furnaces. The ore is obtained largely from the limestone ridge in Leicestershire and Lincolnshire.

(5) At the extreme southern end of the coalfield are Nottingham, noted for its manufacture of lace, cycles, and general engineering, and Derby on the Derwent tributary of the Trent The latter is a great engineering centre, and manufactures railway rolling stock.

THE LANCASHIRE INDUSTRIAL AREAS

1.—**The Coalfield** (see Fig. 19). This coalfield occupies the western flank of the Pennines, between the rivers Ribble and Mersey. On the east the limit of the coalfield is about the junction of the Lancashire plain with the foothills of the Pennines. On the south the limit of the coal-mining area forms an arc of a circle round Manchester. The "field" is divided into two distinct areas by an upfold of rock known as the Rossendale Anticline. To the north of this upfold is the Burnley coalfield, while to the south is the Lancashire coalfield proper. From the high land of the Rossendale Anticline, tributaries of the Ribble drain northward,

and feeders of the Mersey drain southward. These tributary streams have been of great importance in determining the routes followed by roads, railways, and canals within the area.

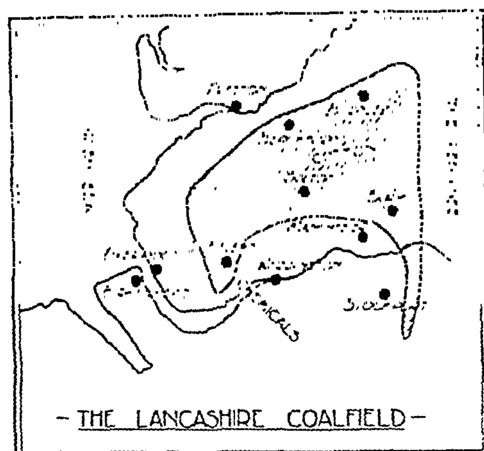


Fig. 19

2.—**The Cotton Industry.** This is concentrated in the northern and eastern part of the area. The raw cotton is imported from the United States, Egypt, and India via the port of Liverpool, or direct to Manchester via the Manchester Ship Canal.

Spinning is carried on chiefly in the towns around Manchester—Bolton, Bury, Oldham, Ashton, Glossop, Stockport, etc.; while the weaving is predominantly associated with the towns on the northern and eastern edges of the coalfield, e.g. Preston, Blackburn, Accrington, Burnley, Nelson, Colne, Todmorden.

3.—**Engineering.** The manufacture of machinery for the cotton industry, e.g. looms, spinning machines, boilers, and engines, is carried on in nearly every large town of the coalfield. Oldham is particularly important in this branch of industry, though Bolton, Accrington, Bury, and Blackburn also take an important share.

4.—**Iron-smelting** is carried on chiefly at Wigan and Darwen. Ore is imported from other parts of England, notably from the Furness district of North Lancashire and from Scotland.

5.—**Bleaching and Dyeing** of the cotton fabrics is largely concentrated in the group of small towns occupying the deep valleys of the Rossendale Anticline. Such are the towns of Rawtenstall and Bacup.

6.—**Silk Manufacture.** This is centred on the Lancashire and Cheshire borders in the towns of Macclesfield, Congleton, and Leek. Stockport also has a considerable share in this industry. Other towns in Britain noted for silk manufacture are Derby, Coventry, and London.

Artificial silk is now being manufactured on an increasing scale in many of the cotton weaving and spinning towns.

7.—**Hats** are manufactured at Denton and Stockport.

8.—**Chemicals.** This industry is chiefly concentrated round the lower Mersey. The chief towns are Warrington, Widnes, Runcorn, and St. Helens.

9.—**Soap** is manufactured along the banks of the Mersey estuary, notably at Liverpool, Port Sunlight, and Warrington.

10.—**Paper.** Wood pulp is imported from Canada via Liverpool and the Manchester Ship Canal. It is manufactured into paper in the Rossendale district and in Burnley and other towns on the northern edge of the coalfield.

11.—**Glass** is manufactured at St. Helens.

12.—**Slippers** are made in great quantities at Rawtenstall and Waterfoot.

Liverpool is the great port for this huge and complex industrial area, though it also serves the manufacturing districts of Yorkshire and the Midlands. Its trade is chiefly with America. The chief imports are raw cotton, wheat, flour, cattle, bacon, and wool. The chief exports are cotton goods, woollen goods, machinery, soap, and chemicals.

Across the Mersey is the twin port of Birkenhead.

The Ship Canal follows the line of the Mersey from Eastham, on the south side of the Mersey estuary about three miles south of Liverpool, through Runcorn, Widnes, Warrington, and Irlam to Manchester. It has proved a great asset to the cotton industry and to Lancashire generally. Half its trade is concerned with the import of cotton and the export of cotton goods, but it also imports large quantities of oil, wheat, timber, and fruit.

Preston, besides being an important cotton-manufacturing town and an important railway junction, is also a port. Only small ships can get up the shallow estuary of the Ribble, but some importation of wheat, flour, and timber is carried on at the port.

Fleetwood is a packet station from which fast steamers sail to the Isle of Man and Ireland. It is also an important fishing centre.

Heysham, on the peninsula between Morecambe Bay and the estuary of the Lune, is the packet station built by the old Midland Railway to compete with Fleetwood, which was served by the Lancashire and Yorkshire Railway

THE FURNESS IRON DISTRICT

The Furness district is the detached part of the county of Lancashire which lies north of Morecambe Bay. In the limestone of this district valuable iron ore is found. Notable mining

districts are those round Ulverston, Millom, Dalton, and Carnforth. The iron is smelted in these towns, the coke for the purpose being imported from the coalfields of northern England. Barrow has in addition important shipbuilding yards.

THE NORTHUMBERLAND AND DURHAM INDUSTRIAL AREA

The industries of this area may be grouped under the headings of coal, iron, and salt.

1.—**The Coalfield** (see Fig. 20) is a roughly rectangular area extending along the coast from the mouth of the Coquet to the

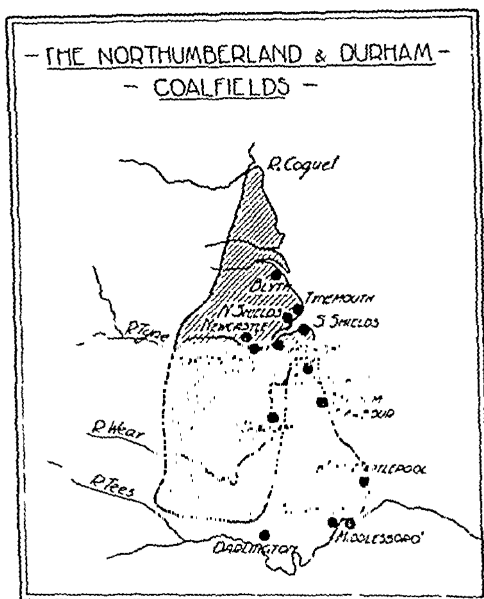


Fig. 20

mouth of the Tyne, and on the south almost to the river Tees. Coal is, however, mined under the newer rocks between the Wear and the Tees.

A great deal of the coal mined in this area is exported. The chief ports are Newcastle, Sunderland, Blyth, and West Hartlepool.

2.—**Iron-mining and the Iron Industry.** The chief mining districts are the escarpment of the Cleveland Hills south of the estuary of the Tees, and the Esk valley near Whitby.

The iron is smelted at Middlesbrough and Stockton.

Darlington manufactures engines and rolling stock for the London and North-Eastern Railway.

Shipbuilding, using largely the Tees-side iron, is a very

important industry in the ports of Newcastle, Sunderland, and West Hartlepool.

Engineering, including particularly the manufacture of ships' engines and electrical apparatus, is an important industry in all the towns of this area, but more especially in Newcastle.

3.—**Salt** is mined in the area between the Wear and the Tees. It is used in the chemical and glass industries of Newcastle.

THE PORTS

These are, of course, grouped round the estuaries of the three rivers.

(*a*) *The Tyne ports* include, besides Newcastle, the towns North Shields and Tynemouth on the northern side of the estuary, and Gateshead, Jarrow, and South Shields on the southern side.

The chief exports are coal, coke, ships, and metal goods. The *imports consist mainly of foodstuffs such as wheat, flour, and dairy* produce, timber, and iron ore from Sweden.

(*b*) *Sunderland*, at the mouth of the Wear, has a similar trade to that of the Tyne ports.

(*c*) *The Tees ports* are West Hartlepool and Middlesbrough. The former deals very largely with the export of coal. The latter exports steel rails and all kinds of machinery and metal goods.

Stockton, at the head of the estuary, has suffered from the competition of the better-equipped ports at the mouth. It has accommodation for only small steamers, and its interests are confined rather to iron smelting and manufacture than to export.

(*d*) Other ports on the north-east coast which owe their existence to their facilities for the export of coal are Blyth, twenty miles north of Tynemouth, and Seaham Harbour, ten miles south of Sunderland.

THE LAKE DISTRICT. (See Figure 21)

*1.—**Position and Structure.*** This is a roughly circular mass of high mountains, deep valleys, and long ribbon-like lakes which occupies the counties of Cumberland, Westmorland, and the Furness district of Lancashire. It differs from all other English high-land areas in that it is formed of much older rock, which is very hard and has been twisted and folded in a very complex manner. It resembles very closely in structure the Cambrian Mountains of Wales. The closest structural resemblance amongst the English hills is in the Charnwood Forest area.

2.—**Relief, Lakes and Rivers.** The various mountain

masses lie at heights varying from 1200 to 3000 feet above sea-level. The most notable peaks are near the centre of the mass, viz. Scafell (3162 feet), Scafell Pikes (3210 feet), Great Gable (2949 feet), Helvellyn (3118 feet), Skiddaw (3053 feet).

The drainage radiates from a centre near Scafell, the valleys with their lakes being arranged like the spokes of a wheel. The following radiating lines should be carefully noted on the map, and the student should practise drawing a memory map for himself :—

(*a*) From Dunmail Raise, where the boundary between Westmorland and Cumberland crosses the low ground between Langdale Pikes and Helvellyn, a small stream drains successively the line of Lakes Grasmere, Rydal Water, and Windermere. The drainage from the southern end of Windermere is by the small river Leven, running from Lake Side, through Newby Bridge, to the arm of Morecambe Bay which runs up to Greenodd.

(*b*) From the high land around Coniston Old Man (2633 feet) various tributary streams are collected in Coniston Water, which drains southward by a small stream which joins the Greta at Greenodd.

(*c*) The river Duddon, further west, flows between Scafell and Coniston Old Man. Its valley differs from most other valleys of the Lake District in that it has no lakes in it. Southward it reaches the sea in the broad, shallow bay known as the Duddon Sands, between Dalton-in-Furness and Millom.

(*d*) The river Esk flows from near Scafell Pikes south-eastward through Eskdale to the Cumberland coast near Ravenglass. Like the preceding valley, it has no lakes in it.

(*e*) North-west of Eskdale is the valley in which lies Wastwater, whose head-streams drain down from the central mass of high land about Great Gable. The lake is drained southward by a small stream which joins the river Esk in its estuary at Ravenglass.

(*f*) Ennerdale Water, occupying the next valley to the north, drains westward via Cleator Moor.

(*g*) Buttermere and Crummock Water, drained by the river Crocker, a tributary of the Derwent.

(*h*) Derwentwater and Bassenthwaite lie in a deep valley drained by the river Derwent, which flows northward, then westward through Cockermouth to the coast at Workington.

(*i*) Thirlmere, at the foot of Helvellyn, lies in a deep valley which continues the line through Dunmail Raise from Lake Windermere. A low pass at the northern end of the lake leads down to Keswick.

(*j*) Ullswater lies between the Helvellyn mass on the west and

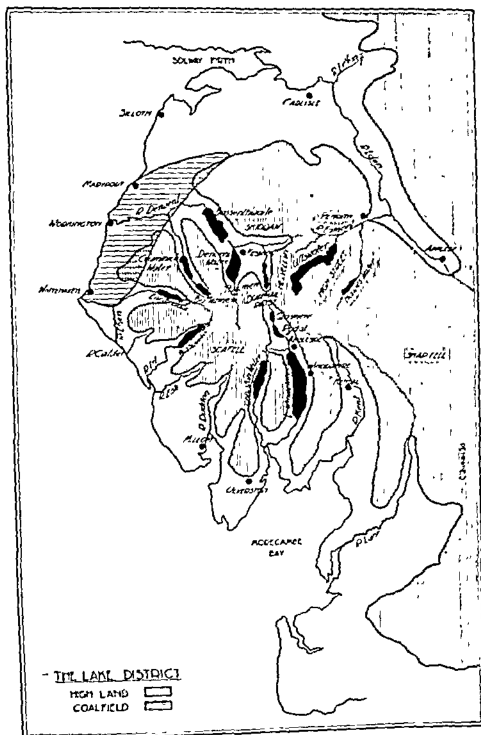

SOLWAY FIRTH
SKIDDAW
SCAFELL
THE LAKE DISTRICT
HIGH LAND
COALFIELD

Fig 21

High Street (2683 feet) on the east. It is drained north-eastward by the river Eamont, a tributary of the Eden.

(*k*) Hawes Water, to the east of Ullswater, is a small, rather inaccessible, and little-known lake between Shap Fell and the High Street mass.

(*l*) The "wheel" of valleys is completed by that of the river Kent, which flows southward through Kendal to the shallow arm of Morecambe Bay between Grange and Arnside.

3.—**Railways.** The only railway which crosses the area is that from Penrith, down the valley of the Greta to Keswick, and thence down the valley of the Derwent to the coast at Workington. Other lines, however, penetrate the region from the outside. The most important of these are :—

(*a*) A branch from the main line of the old London and North-Western Railway through Carnforth and Kendal to Windermere. (The main line itself runs along the eastern edge of the area, up the valley of the Lune, and across a shoulder of the Lake District mountains at Shap, thence down the Vale of Eden to Carlisle.)

(*b*) The Furness Railway (now part of the London, Midland and Scottish system) has as its main line the coastal route, round the head of Morecambe Bay, through Carnforth, Grange, Ulverston, Dalton-in-Furness, Millom, Ravenglass, Whitehaven, Workington, Maryport, to Carlisle.

Branches from it run from :

(*c*) Ulverston, through Greenodd to Newby Bridge and Lake Side, at the foot of Windermere. Steamers continue the journey to Ambleside at the head of the lake.

(*d*) From Foxfield, near Broughton-in-Furness, up to Coniston, on the banks of Coniston Water.

(*e*) A short narrow-gauge railway from Ravenglass up the lower part of Eskdale.

This paucity of railways, in an area which attracts so many visitors, is an adequate commentary on the mountainous nature of the country.

4.—**Roads and Passes.** (*a*) The principal main road through the area runs from Grange in the south, up the eastern side of Windermere, through Ambleside, thence over the very low pass of Dunmail Raise to Wastwater, Keswick, and Maryport.

(*b*) From Windermere a main road crosses over the difficult Kirkstone Pass to Patterdale, and thence down the western side of Ullswater to Penrith.

(*c*) From Ambleside an easy route leads to Coniston Water, and thence to Broughton-in-Furness.

(*d*) The main road between Penrith and Keswick follows the valley of the Greta.

The fact that these four are the only good motoring roads in the area should give the student a clear appreciation of the mountainous nature of the country.

Famous passes are Sty Head Pass, between Borrowdale (leading down to Derwent Water) and Wastwater; Wrynose Pass, at the head of the Duddon Valley; and Stake Pass, near Langdale Pikes.

5.—Occupations of the People.

(*a*) *Farming.* The mountainous nature of the country and the very small proportion of fertile low land make agriculture almost impossible. The heavy rainfall, due to the great height of the land, makes the low valleys suitable for cattle-rearing and dairy farming. Westmorland has about the same number of cattle in proportion to its area as the average for England. Cumberland, owing to its greater proportion of low land, has slightly more cattle.

Sheep-rearing is, over the greater part of the area, the only profitable occupation. Westmorland has about seven sheep for ten acres, Cumberland about six sheep for ten acres, while the average for England is about three sheep for ten acres.

(*b*) *Mining.* (i) Lead-mining is carried on in the region round Helvellyn.

(ii) Graphite or black lead was formerly mined in Borrowdale; though the local supply of graphite is now almost exhausted, the manufacture of lead pencils is still carried on at Keswick.

(iii) Iron ore is mined in the Furness district and taken to Millom, Barrow, and Ulverston for smelting.

(iv) Coal is mined on the coalfield round Workington. This region is, however, quite distinct from the Lake District, and will be dealt with in a separate section.

(v) Building stone is quarried for local use throughout the region. Shap granite is famous for its large crystals of pink felspar. It is one of the most widely used of ornamental building stones.

(*c*) Catering for the needs of tourists is one of the chief sources of income for the people.

THE CUMBERLAND COALFIELD

This coalfield extends along the coast from Maryport [illegible] north to a little south of Whitehaven It has an average [illegible] of about ten miles. The Coal Measures extend under the s[illegible] some distance. No great industry has grown up on the [illegible] the greater part of the coal being exported by sea fro[illegible]

haven and Maryport to the Belfast district of Ireland and to the Furness district around Barrow.

Workington is in the centre of an iron-mining district, and uses the local coal and iron ore as the basis of a smelting industry.

THE VALE OF EDEN

This fertile valley, lying between the Pennines on the east and the Lake District on the west, forms a great contrast with the barren mountainous regions on either side. It is composed of a tongue of New Red Sandstone, which forms a fairly fertile soil. Being in the shelter of the Cumbrian Mountains, it has a rather dry climate, and is therefore suitable for general agriculture. Little wheat is cultivated, however, the chief cereals being oats and barley. Dairy farming is extensively carried on in the low lands around the river Eden.

Appleby, the county town of Westmorland, is a market town for the surrounding cattle and sheep-rearing district.

Penrith, on a tributary valley, is an important market town and railway junction.

Carlisle owes its importance to its position at the meeting-point of various routes, viz. :—

(*a*) Northward through Gretna to Scotland.

(*b*) Southward through Penrith to Lancaster, and through Appleby to the Aire Gap.

(*c*) Westward through Wigton to Maryport, and along the southern coast of the Solway Firth to Silloth.

(*d*) Eastward through the Tyne Gap to Newcastle.

It also manufactures agricultural implements, and is a market town for the surrounding farming district.

THE ISLE OF MAN

This island is almost centrally placed in the Irish Sea, being about thirty miles distant from the coasts of Cumberland, southern Scotland, and north-eastern Ireland.

The northern part of the island is a low plain formed of "recent" deposits. The central and southern parts are high-land areas, formed mainly of old rock like that of Wales, though around Castletown, in the south, and Peel, in the west, are areas of limestone like that found in the northern and southern Pennines.

Farming activities are chiefly devoted to the rearing of sheep and cattle.

Fishing is an important industry, the chief town being Peel, situated on a sheltered harbour on the west of the island.

Lead is mined on the eastern side of the island near Laxey.

The beautiful scenery and attractive sands make the island a favourite summer playground and holiday resort for the teeming population of the industrial regions of the Midlands and northern England. T[illegible]

The hig[illegible]

The Ra[illegible] route of the [illegible] high land c[illegible] plain a difficult route leads to Castletown and Port Erin. (*c*) From Peel a railway skirts the northern edge of the high land, through Sulby to Ramsey. (*d*) A tramway connects Douglas with Ramsey. (*e*) The summit of Snaefell is attained by a branch line from Laxey.

Steamer Routes. The chief routes to Douglas are from Liverpool, Fleetwood, and Heysham on the Lancashire coast. From Ramsey steamer routes go to Whitehaven and Silloth on the Cumberland coast.

Government. The island is governed by the House of Keys, which is to a great extent independent of the British Parliament.

Chapter VII

WALES AND THE SEVERN BASIN

A.—THE SEVERN BASIN

1.—**The Course of the Severn and its Tributaries.** The Severn rises in Plynlimmon, not far from Cardigan Bay. It first flows eastward through Newtown, then turns north-eastward through Montgomery and Welshpool. At the boundary between Shropshire and Montgomery it is joined by the river Vyrnwy. Lake Vyrnwy, through which the latter stream flows, is an artificial lake constructed to form the source of the water-supply of Liverpool.

On entering the county of Shropshire, the Severn turns eastward and winds across a low plain to Shrewsbury. In this district, only a low watershed divides the Severn from the basins of the Dee and the Weaver.

From Shrewsbury the river turns south-eastward, receives the rivers Roden and Tern from the north, and soon enters a gorge with high land on each side. On the western side are, in turn, the ridges of the Stiper Stones, Longmynd, Caradoc Edge, Wenlock Edge, and the Clee Hills. On the eastern side the land is lower, the only prominent ridge being that of the Wrekin.

At Stourport is the confluence with the river Stour, which drains from the high land about the Black Country of south Staffordshire.

Beyond Stourport the Severn enters the plain of Worcestershire, receiving on the right bank the tributary river Teme. (Note.—The right bank is found by facing the way the river is flowing. The right bank is then on the observer's right hand.)

On the borders of Worcester and Hereford are the Malvern Hills. On the left bank the river Avon, which drains the Vale of Evesham, lying at the foot of the limestone escarpment of the Midlands, joins the Severn at Tewkesbury.

The plain of Hereford is drained by the river Wye and its tributaries the Arrow and the Lug, while another tributary of

the Wye, the Monnow, drains the plain of Monmouthshire. The combined river, the Wye, does not enter the Severn until the latter river has opened out into its estuary. It is nevertheless to be reckoned as a tributary of the Severn.

NOTE.—The student should note, on the physical and political maps, how the course of the Severn is related to (*a*) the boundary between England and Wales, and (*b*) the boundary between the high land of Wales and the low land of the English Plain.

The Severn estuary may be taken as stretching from the mouth of the Wye, at Chepstow, to a little below Gloucester. The land bordering the estuary is low—less than 200 feet above sea-level; but the bordering high land of the Forest of Dean on the right bank, and the Cotswolds on the left, should be carefully noted.

The Severn Bore is a high wave flowing with great rapidity up the Severn at the time of high tide. It is caused by the tidal wave reversing the usual flow of the water.

2.—**Climate of the Severn Basin.** The upper Severn, above Welshpool, flows in a deep valley through the mountainous region of Central Wales. Here the high land causes abundant condensation of moisture, and the rainfall is very heavy. Below Welshpool, however, the valley is in the shelter of the Welsh mountains; consequently it has rather low rainfall (25 to 30 inches per annum).

The lower Severn, south of the Clee Hills, is open to the south-west winds which blow up the Bristol Channel, penetrate between the Forest of Dean and the Cotswolds, and bring exceptionally mild weather to the whole valley of the middle and lower Severn.

3.—**Farming in the Severn Basin.** (*a*) In the mountainous Welsh part of the basin, the only profitable kind of farming is sheep-rearing.

(*b*) Cattle-rearing and dairy farming are carried on in the fertile lowlands of Shropshire, Worcester, Hereford, and Gloucester.

(*c*) Fruit cultivation is particularly important in the Vale of Aylesbury, Hereford, and Monmouthshire.

(*d*) Hops. Hereford is the only area in the British Isles, except Kent, which specialises in the growth of hops.

4.—**The Coalfields of the Severn Basin** (see Fig. 22). These are:—

(*a*) The Shrewsbury and Le Bottewood coalfields near Shrewsbury. These are of little importance, and are only worked to supply a rather poor quality of house coal for local needs.

(*b*) The Coalbrookdale coalfield, around the towns of Coalbrookdale and Ironbridge. This coalfield is almost worked out. Historically it is of interest as being the first district where coke was used for the smelting of iron. Note the significance of the name Ironbridge in this respect.

(*c*) The Forest of Wyre, on the right bank of the Severn above the confluence of the Stour, is also of only small importance. No great local industries have grown up on any of these fields.

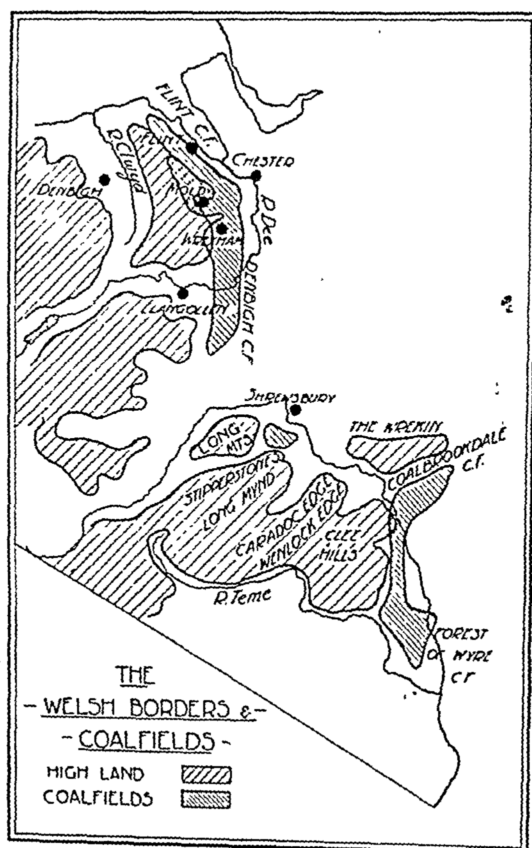


Fig. 22

(*d*) The Forest of Dean coalfield, though not of the first rank among British coalfields, is of much greater importance than the preceding ones.

Iron ore occurs plentifully in the locality, but is not now worked, owing to the competition of cheaper ores from Spain.

5.—**Routes and Town Sites.** The valley of the Severn does not as a whole form a great " through " route, though it is crossed by many important railways, mainly branches of the Great Western.

The most important route-centres of the basin are Shrewsbury, Worcester, Hereford, and Gloucester.

(*a*) *Shrewsbury.* From this town as centre, routes radiate :—

(i) Up the Severn valley, through Welshpool and Newtown—noted for their manufacture of Welsh flannel ; then across a high divide and down the river Dovey to Aberdovey.

(ii) Northward along the edge of the Welsh mountains to Oswestry, Ruabon, Wrexham, and Chester.

(iii) North-eastward to Whitchurch, Nantwich, and Crewe.

(iv) Eastward through Wellington, Wolverhampton, Birmingham, and Warwick to London.

(v) South-eastward along the course of the Severn through Coalbrookdale and Bridgnorth to Worcester.

(vi) Southward through Leominster to Hereford and Newport.

(*b*) From *Worcester* the four most important lines are:—

(i) Northward to Kidderminster and Wolverhampton.

(ii) Southward to Gloucester.

(iii) South-eastward to Oxford and Reading.

(iv) South-westward to Hereford.

(*c*) From *Hereford* lines radiate to Shrewsbury, Worcester, Gloucester, Newport, and up the river Wye, and thence down to Swansea.

(*d*) *Gloucester* is at the junction of routes from:—

(i) Birmingham and the Midlands, via Stratford-on-Avon and Cheltenham.

(ii) From Peterborough and Northampton, via Cheltenham.

(iii) From London, via Reading and Swindon.

(iv) From South Wales, via the coastal plain of Monmouth.

(v) From Bristol, via the coastal plain between the Cotswolds and the Bristol Channel.

The important towns of the area have grown up in almost every instance in the centre of a fertile plain, either at the confluence of rivers, or in such a position as to control the routes in various directions. Hence they
and later railway cen
and Tewkesbury owe their importance to all these causes.

Gloucester, by virtue of its position, should be the port for the Black Country and the Midlands It suffers, however, from the difficulty of navigation of the Severn and the upper part of its estuary. A ship canal has been cut from Sharpness to Gloucester, but this can only be entered at high tide. The chief imports are grain and timber.

Exports are practically negligible, the products from the Black Country being sent in preference to the great ports of Liverpool, Hull, Southampton, London, or Bristol.

B.—BRISTOL AND THE AVON. (See Figure 23)

1.—**The Course of the Avon.** The river rises on the eastern slope of the Cotswolds. It first flows southward and south-ea

ward through the fertile clay vale between the Cotswolds and the Marlborough Downs. Then near Bradford it turns westward, and at Bath breaks through the Cotswolds in a deep gorge. Below Bristol is a second gorge at Clifton.

2.—**Farming in the Basin of the Avon.** The high land of the Cotswolds and the slopes of the Downs and the Mendip Hills are mainly given up to sheep-rearing.

In the clay vales cattle-rearing, dairy farming, and general agriculture are carried on.

3.—**Mining.** (*a*) Iron ore is mined in the limestone escarpment near Westbury. The ore is not smelted locally, but is sent to the furnaces of South Wales.

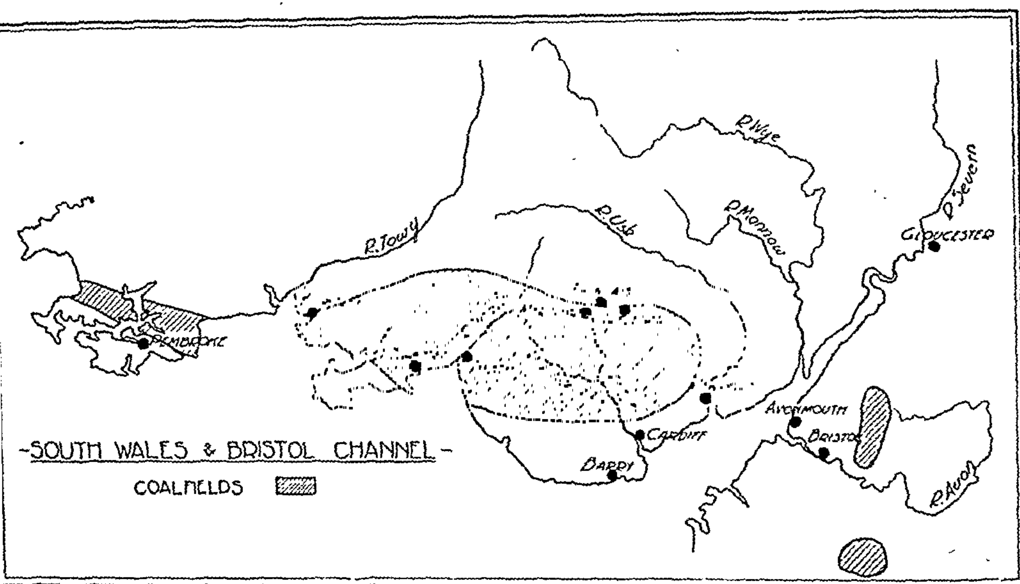


Fig. 23

(*b*) Lead is mined in the Mendips.

(*c*) Building stone of excellent quality is obtained from the limestone escarpment near Bath.

(*d*) Coal. There is in this area a little group of coalfields of minor importance. The chief of them are the Bristol coalfield, between the Cotswolds and the sea, and the Radstock coalfield, south of the Avon.

The total annual output from these fields amounts to about ten million tons. It is all used in the immediate locality.

4.—**The Woollen Industry.** In the middle course of the Avon, between Bath and the limestone scarp, the little group of towns, Bradford, Stroud, and Trowbridge, are engaged in the manufacture of woollen cloth. The industry grew up originally

on the basis of local water-power and the local supplies of wool. It has, of course, suffered from the competition of the more highly organised woollen industry of the West Riding of Yorkshire, but has survived through specialisation in a high quality of produce.

5.—**The Port of Bristol.** The lower Avon was the natural entrance from the Bristol Channel for goods requiring rapid transit overland to London. The river is also directly opposite *America*; consequently the early prosperity of the port depended on trade with the newly formed American colonies. With the increase in the size of ships, however, Bristol as a port decayed. It has to some extent been revived by deepening the passage up the lower Avon through the Clifton Gorge, and by the construction of an outport at Avonmouth.

The trade is still concerned mainly with American produce. The imports, which are five times the value of the exports, consist mainly of wheat, tobacco, and sugar. The exports are manufactured goods, principally iron and steel goods and machinery.

Bath is an ancient city, built where the Avon cuts its way through the limestone escarpment. It owes its origin and name to the mineral springs, which were famous even in Roman times.

Weston-super-Mare is a popular holiday resort between the Mendips and the sea.

C.—WALES. (See Figures 23 and 24)

1.—**Relief and Rivers.** At first sight Wales appears to be such a confused tangle of mountains that no simple plan of the general structure can be detected. It may be noted, however, that the river valleys divide the land into roughly parallel belts running from south-west to north-east. We will take each of these belts in turn from north to south.

(*a*) Anglesey is a roughly rectangular island, composed of very ancient rock, which, though very hard, has been worn down almost to sea-level. Although it is by no means a level area, there are no parts which are over 600 feet in height.

It is separated from Carnarvonshire, on the mainland, by the narrow Menai Straits, running from Bangor to Carnarvon.

(*b*) (i) The peninsula of Carnarvon, terminating in the Llyn Promontory, forms the first belt of land, running from south-west to north-east. It is bounded on the eastern side by the river Conway, and on the south by the Vale of Festiniog. The peninsula contains Snowdon (3560 feet), the highest mountain in England and Wales, Carnedd Llewelyn (3484 feet), and many other peaks above 3000 feet in height. The Snowdon mass is a miniature of the Lake District of Cumberland. Like the latter, its drainage is

by streams radiating from the central high-land mass; and the valleys of these streams contain many lakes.

Towards the south-western end of the peninsula the land falls considerably, and there are large areas of low land.

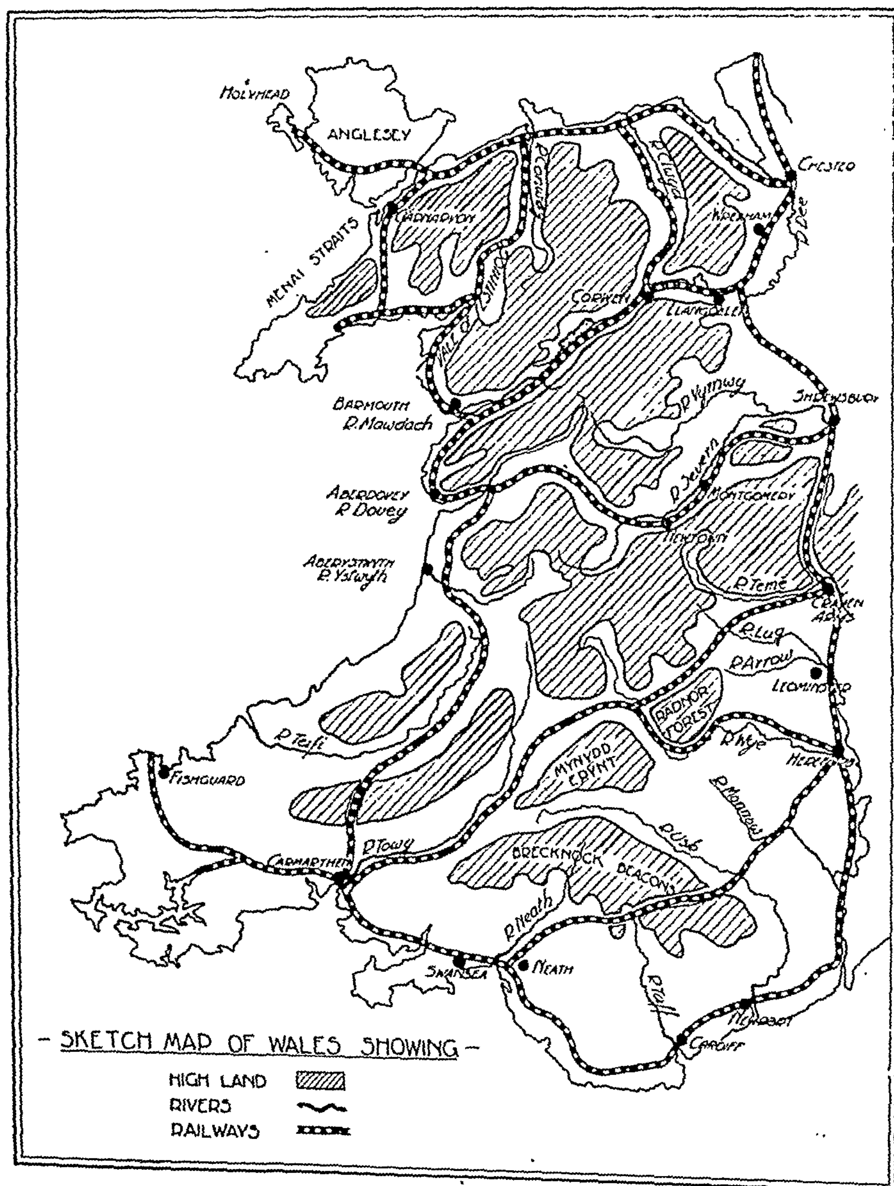


Fig. 24

(ii) The counties of Denbigh and Flint hardly fit in with the general structure of Wales. Here the grain of the land is from south-east to north-west; notice, for example, the valley of the

Conway, the Vale of Clwyd, and the estuary of Dee, all of which follow this general direction.

(*c*) The upper valley of the Dee, from above Bala to Llangollen, forms part of another dividing line from south-west to north-east. The line is continued to the south-west by the river Mawdach, which enters the sea at Barmouth (=Aber Mawdach=mouth of the Mawdach).

Between the Mawdach-Dee valley and the Vale of Festiniog, to the north, lies the mountain mass of the Arenigs (e g. Arenig Fawr, 2800 feet), continued to the north-east by the Berwyn mountains.

(*d*) Southward, again, the Cader Idris range, reaching a height of 2929 feet, lies between the Mawdach valley and the valley of the Dovey, which enters the sea at Aberdovey.

(*e*) The central mass of the Welsh mountains, around Plynlimmon, is bounded in part by the Ystwyth, which enters the sea at Aberystwyth (=mouth of the Ystwyth), and in part by the upper course of the Severn. Note, however, that a tributary of the Severn has cut a valley through the mountains, which forms a fairly low pass over into the valley of the Dovey.

(*f*) In Cardiganshire and Carmarthenshire the rivers Teifi and Towy, entering the sea at Cardigan and Carmarthen respectively, divide the south-western mountains up into blocks following the same general south-west to north-east direction. Note, also, how the line of the upper valley of the Towy is continued by the head-waters of the river Wye

(*g*) On the eastern side of South Wales the relief of the land cannot be so easily related to one general direction. The student is advised first to insert on an outline-map the course of the rivers Severn, Teme, Lug, Wye, and Monnow (see *previous section on* the Severn Basin), and then fill in the high land in relation to them.

Note, for example, how the Radnor Forest is enclosed between the Teme and the Wye

(*h*) In the south the river Usk, in its upper course, divides the high land of *Mynydd Epynt from the* Brecknock Beacons. From the latter range the rivers Neath and Taff flow respectively south-west and south-east to the sea at Neath and Cardiff.

The only extensive areas of plain in South Wales are: (i) the peninsula of Pembroke; (ii) the pensinsula of Gower; (iii) the coastal plain of Glamorgan.

On the coast of Cardigan Bay the mountains come down close to the coast, leaving little room for a coastal plain. Here the only lowland areas are where rivers have filled up the lower courses of their valleys with sediment.

2.—**Railway Routes.** (See Fig. 24.) The course of these is absolutely controlled by the valleys and the coastal plain.

The student should trace out the following routes on a map, and note their relation to what he has already learnt about the relief and rivers of Wales:—

(*a*) (i) The London, Midland and Scottish route (old L. and N.W. Railway) from Crewe, through Chester, along the southern shore of the shallow estuary of the Dee; then along the coastal plain of North Wales, through the holiday resorts of Rhyl, Abergele, Penmaenmawr, to Bangor; then across the Menai Straits and through Anglesey to Holyhead, the packet station for Ireland.

A branch line runs to Llandudno, the famous holiday resort at the foot of Ormes Head.

(ii) The above route continues along the coastal plain to Carnarvon. From this town the line runs southward through a low gap to Afonwen, near Criccieth.

Two other important branch lines running southward from the coastal route are:—

(iii) Up the Vale of Conway to Bettws-y-Coed, and thence via Blaeneau Festiniog down the Vale of Festiniog to Portmadoc.

(iv) Up the Vale of Clwyd, through Denbigh to Corwen in the valley of the Dee.

Practically all the other railways of Wales belong to the Great Western system.

(*b*) From Chester, through Ruabon, and along the Dee valley via Llangollen, Corwen, and Bala, thence down the Mawdach valley to Barmouth.

(*c*) From Shrewsbury, up the valley of the Severn, through Welshpool, Montgomery, and Newtown, then by the tributary valley mentioned in paragraph 1 (*e*) above, to Aberdovey.

(*d*) The "border route," along the eastern edge of the Welsh mountains, through Chester, Shrewsbury, Craven Arms, Leominster, and Hereford to Newport.

(*e*) An important cross route branches from (*d*) at Craven Arms, winds round the northern edge of the Radnor Forest into the valley of the Towy, and thence down to Llandovery, Llandilo, and Carmarthen.

(*f*) An almost parallel route branches off at Leominster and, following portions of the valleys of the Wye, the Usk, and the Neath, leads down to the ports of Neath and Swansea.

(*g*) The main line of the Great Western Railway enters this area via the Severn Tunnel, and runs along the coastal plain of Glamorgan, through Newport, Cardiff, Neath, Swansea, Llanelly, and Carmarthen to Pembroke Dock (a naval station), and to

Fishguard, a packet station whence regular steamers sail to Wexford, Waterford, and Cork, in southern Ireland.

(*h*) The only part of Wales where there is a network of branch lines comparable to those found in the industrial districts of England is in the county of Glamorgan. Here the railways follow every valley, to tap the wealth of the collieries situated there.

(The student must not attempt merely to learn the above statements "off by heart." The only way is to become interested in working out the factors which have determined the course of the different routes. Practise putting rivers, high land, railways, and towns on an outline map. Then *from your map* try to write out a description of the relief, rivers, and railways of Wales. Then read over the above descriptions again, seeing which points you have missed, and mark these for special attention at a later date.)

3.—**Farming in Wales.** (*a*) *Cattle-rearing.* Wales as a whole is too mountainous for the rearing of cattle. Where, however, fertile low lands are exposed to the mild, moist west winds from the Atlantic, dairy farming becomes an important industry. The principal areas famous for cattle are Anglesey, which has more cattle in proportion to its size than any other county in England and Wales; the western end of the peninsula of Carnarvonshire; Flintshire, Pembrokeshire, and the low lands of Glamorgan. The student should find these counties on the physical map, and note the comparatively large area of low land which they embrace.

(*b*) *Sheep-rearing.* Wales is pre-eminently a sheep-rearing region. It has, in proportion to its size, three times as many sheep as England. Of the total number of sheep in England and Wales it has about one-third.

Naturally the counties which have most cattle have fewest sheep, and vice versa. Thus Anglesey has only one sheep for 2½ acres; Flint, one for 2½ acres; Pembroke, one for 3 acres: while Merionethshire has one sheep per acre; Brecknockshire, almost as many; Montgomery, one sheep for every 1¼ acres. Cardiganshire and Radnor are almost equally important for sheep-rearing, while Carnarvonshire has one sheep for about 1¼ acres.

The student should observe that the counties with the greatest proportion of high land are those which have the greatest number of sheep per acre.

(*c*) *Arable farming.* The small percentage of low, fertile ground, and the wet cloudy climate, do not permit cereals to be grown to any great extent. The only counties which grow wheat in any appreciable quantity are Carmarthen, Glamorgan and Montgomery, and even they have less land under wheat in proportion to their area than any counties in England except Cumberland, Westmorland, and Northumberland.

Oats is the chief crop grown. Potatoes, root crops, and barley are also cultivated. Rye is grown on the sandy lands around Cardigan Bay, in Anglesey. This is one of the few places in Britain where the culture of this cereal still survives.

4.—**Mining and Quarrying.** The coalfields and the industries on them are dealt with in the succeeding section. Apart from coal, the most important "mineral" obtained in Wales is slate. The chief districts where it is quarried are: at Bethesda near Carnarvon, Penrhyn and Llanberis in Carnarvonshire, and Festiniog in Merionethshire.

Excellent road-metal occurs in abundance in the hard old rocks which make up the greater part of the Welsh mountains. It is, however, extensively quarried only where easy transport to other districts is possible. Penmaenmawr in North Wales is particularly famous for its granite sets and other forms of road-metal. Rhayader, in Radnor, is also noted for a durable road-metal.

Metals are distributed rather sparingly among the Welsh rocks. In a few scattered localities lead, zinc, and copper have been mined, but the cost of working and transport is generally too high to make the mining profitable. Gold occurs in very limited quantities, and a mine near Dolgelly has been worked, off and on, for a long period. Copper is mined in small quantities in Anglesey.

5.—**The Coalfields of North Wales.** The minor coalfields of Flint and Denbigh (see Fig. 22) occur on the edge of the old rocks of which Wales is built. They form an almost continuous line from the Point of Ayr, through the towns of Flint, Mold, Ruabon, Wrexham, and Oswestry. The amount of coal produced is, however, small in proportion to the size of the coalfield, and is insufficient to support any large industries.

6.—**Industries of North and Central Wales.**

(*a*) On the coalfields of Flint and Denbigh, chemical works and the smelting of lead are carried on near the estuary of the Dee.

(*b*) Flannel and woollens are manufactured at Dolgelly, Newtown, and Welshpool, though even this industry is rapidly decaying through the competition of the more highly organised region of the West Riding of Yorkshire.

(*c*) The abundance of streams with rapid flow of water holds out a possibility of the future development of industries in this area, based on electrical power derived from waterfalls. An instance of this is to be found in the Conway valley, the electrical power being used for the smelting of aluminium.

7.—**Town Sites and Pleasure Resorts.** Most of the Welsh towns have grown up on the edge of the high land, on narrow

coastal plains, or at the mouths of the rivers. (*a*) Along the coastal route on the north of Wales the following should be noted: Flint, Holywell, Conway, Bangor, and Carnarvon. The well-preserved castles at Conway and Carnarvon are indications of the value of the sites as the controlling points of diverging routes. The same factor has, in modern times, made them the market towns for the area.

(*b*) On the eastern boundary of Wales the line of towns, Wrexham, Ruabon, and Welshpool, marks the junction of the [illegible]

almost exclusively at the mouths of the rivers: e.g. Portmadoc, at the mouth of the Vale of Festiniog—this is the port from which the slate of the Festiniog district is shipped; Barmouth, Aberdovey and Aberystwyth, at the mouths of the Mawdach, Dovey, and Ystwyth.

(*d*) Where the valleys are broader and more fertile, towns have grown up in the middle course of the river, e.g. Dolgelly, Machynlleth (above Aberdovey), Lampeter in the valley of the Teifi, Llandovery, and Llandilo on the Towy.

8.—**The South Wales Coalfield.** The population map (see coloured map on page 10 of the Atlas) shows that, apart from a narrow strip along the northern coast, the only area of dense population in Wales is near the south coast, in the county of Glamorgan and the eastern part of Carmarthenshire. This area is densely populated, mainly because of the presence of coal in easily accessible seams, and because of the industries which have arisen on the coalfield.

The region is so different from the rest of Wales that it is necessary to consider it separately The student should work out for himself as many contrasts as possible between southern and central Wales.

The coalfield (see Fig. 23) extends as a great oval from a little west of the river Usk to Kidwelly on Carmarthen Bay—a distance of about sixty miles. Its average width is about twenty miles.

A narrow extension of the coalfield runs across the south-western peninsula of Pembroke, from Tenby to St Bride's Bay.

The coalfield is intersected by streams which run transversely across the coalfield from the Black Mountains and Brecknock Beacons in the north. The chief of these rivers are the Neath, the Rhondda, the Taff, the Rhymney, and the Ebbw. In the eastern part of the field the coal is of the usual "bituminous" character. Further west, however, between Swansea and Llanelly,

a very hard coal, specially useful for raising steam in ships' boilers, is mined. Still further west, in the extension of the coalfield across Pembroke, anthracite is mined.

The great industry in which this coalfield has specialised is the smelting of iron and the manufacture of tin-plate. The iron was formerly obtained locally, but is now imported, largely from Spain. The chief iron-smelting and steel-manufacturing towns are: Merthyr Tydvil, Dowlais, Tredegar, and Aberdare on the northern edge of the coalfield; Llanelly, Swansea, and Cardiff on the coast.

Tin-plate is the special industry of Llanelly and Swansea. The tin, which is put as a very thin film over the thin sheets of iron, is brought mainly from the Malay States.

Copper and lead are also smelted at Swansea and other towns in the area.

THE PORTS

A great deal of Welsh coal is exported, consequently the Welsh ports are concerned very largely with this commodity, though tin-plate, engineering products, and general metal-work form a large part of the exports.

(1) *Cardiff*, (*a*) situated at the mouth of the Taff, is the largest city in Wales, having a population of over 200,000.

(*b*) It is well situated to tap the coal-mining area of the eastern part of the coalfield, as it is near the convergence of several valleys—e.g. the Rhymney, the Rhondda, and the Ogmore valleys—which make deep north-to-south trenches across the region.

(*c*) The exports consist chiefly of coal; other commodities are patent fuels, steel rails, and railway carriages.

(*d*) The chief imports are iron ore, timber, pit props, grain, fruit, and frozen meat.

The timber comes mainly from northern Russia, Finland, Norway, Sweden, and Canada; the iron ore from Spain; the grain from Canada; the meat from Argentina and Australia; the fruit from the Mediterranean countries, California, and Australia.

(2) *Swansea.* This is the chief port of export for the steam coal and the anthracite of the western part of the coalfield. Other important exports are tin-plate and various kinds of metal goods.

The chief imports are iron, copper, tin, and petroleum. It is also an important centre of fisheries. Its population is 160,000.

(3) *Newport* is situated at the mouth of the river Usk. Though just off the coalfield, it has important exports of coal, steel rails, railway material, and tin-plate. Besides the local coal and manufactured products it exports a good deal of the articles

manufactured in the Birmingham (Black Country) district. Its population is nearly 100,000.

(4) *Barry Dock* was specially constructed to relieve the pressure of the coal traffic at the older ports. Like these ports, its trade is mainly concerned with the export of coal, but it has also large imports of timber and grain.

(5) *Port Talbot* is situated near Aberavon, and shares with Swansea the export of coal, coke, tin-plate, and steel. The imports are chiefly copper, iron, and timber.

(6) *Briton Ferry* and *Neath* are situated at the mouth of the river Neath. The former has the deeper water, and is consequently the more important port. The lists of imports and exports are almost identical with those of Swansea, though bricks figure in the case of Briton Ferry.

(7) *Llanelly*, though primarily a smelting and tin-plate town, is also a port of minor importance.

(8) *Fishguard* has a harbour, protected by a breakwater, capable of providing accommodation for all but the largest steamers. It has been specially constructed as the terminus of the Great Western main line, and is the packet station for Ireland.

(9) *Milford Haven* is a naval station and a fishing port. Oil and timber are imported, but the exports are not important. Little coal is exported, as it is away from the productive part of the coalfield.

Chapter VIII

SCOTLAND

I. Introductory

A.—CONTRASTS BETWEEN EAST AND WEST

THESE contrasts are not as marked as in the case of England and Wales, but the following are important :—

(1) In the northern half the high land approaches much nearer the coast on the western side than on the east.

(2) In consequence of this, the rivers on the west are much shorter and more rapid than those on the east.

Note, however, the exception of the Clyde, which may in this respect be compared with the Severn.

(3) The coast-line on the west is much more rugged and irregular than that on the east.

(4) The west is fringed with many large and innumerable small islands ; the east is almost free of islands.

(5) The western side has very heavy rainfall, mainly over 60 inches per annum ; while the eastern side has rather low rainfall —under 25 inches near the coast.

(6) (*a*) On the western coast the summer temperatures are lower than at the same latitude on the east.

(*b*) The winter temperature is higher on the west than on the east.

(*c*) The western side has therefore a more equable climate than the eastern side.

(7) The density of population, with the exception of that on the estuary of the Clyde, is greater on the east than on the west.

B.—COMPARISONS WITH ENGLAND AND WALES

(1) The area of high land is much greater and the mountains are higher in Scotland. Only Wales and the Lake District are comparable with Scotland in this respect.

(2) Scotland has therefore a much larger proportion of barren, unproductive land than England.

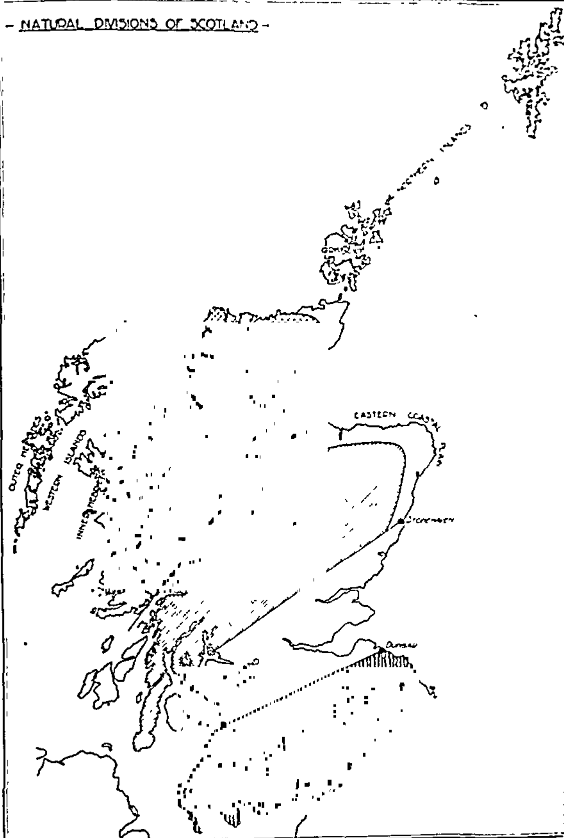

- NATURAL DIVISIONS OF SCOTLAND -
EASTERN COASTAL
WESTERN
ISLANDS

Fig. 25

(3) This last point is reflected in the population map (see Atlas), which shows that more than one-half of Scotland has a density of population below 32 per square mile, while in England such a low density is reached only in the Lake District and the north Pennines. Central Wales, owing to the mountains, has also a low density of population.

(4) Climatically, Scotland is cooler both in summer and winter than England, since it is further from the equator. The great height of the land makes Scotland much colder than shown on the isotherm maps, for these maps show only the temperatures as they would be if all the land were at sea-level.

(The above comparisons and contrasts must be worked out by the student from the atlas. They are not given as exhaustive, but rather as suggestive of the manner in which the study of a country should be approached. First find out all you can by a study of the map; during your reading, constantly refer to the coloured map and the black-and-white sketch-maps, make sketch-maps for yourself, and frequently write out comparisons between one area and another.)

C.—THE NATURAL DIVISIONS OF SCOTLAND

(See Figure 25)

Scotland falls quite easily into three broad divisions, each of which differs considerably from the others in the height of land, fertility of the soil, the minerals, the industries, the occupation of the people, and the density of population.

These divisions are, from south to north :—

I. The Southern Uplands.
II. The Midland Plain.
III. The Highlands, which include :
(*a*) The Grampian Highlands.
(*b*) The Northern Highlands.
(*c*) The Western Isles.

Each of these areas will be described in turn.

II. The Southern Uplands. (See Figure 26)

1.—**Relief.** (*a*) The southern boundary of this region is formed by the Solway Firth, the river Liddel, the Cheviot Hills, and the lower Tweed. On the north the boundary is usually given as a line from Dunbar on the east coast to Ayr on the west coast. Note, however, that a considerable area of high land extends to the north of this line.

(*b*) The land is nearly all over 600 feet in height, while in the middle is a belt of mountainous country running from Loch Ryan on the west coast to St. Abb's Head on the east. This belt is mainly over 1200 feet in height, but nowhere reaches 3000 feet.

(*c*) The chief ranges of hills to be noted are: the Lowther Hills (or the Lead Hills) in the southern angle of Lanarkshire; the Pentland Hills in Edinburghshire; the Moorfoot Hills and Lammermuir Hills between Haddington and Berwick.

Fig 26

2.—**The Rivers** may be grouped as follows:—

(*a*) *The Solway Group.* This includes the Esk, with its tributary the Liddel (which latter river forms part of the boundary between England and Scotland), the Annan, the Nith, and the Ken.

(*b*) *The Tweed.* The main stream rises near the meeting of the boundary lines between the counties of Lanark, Peebles, and Dumfries. The courses of the following tributaries should be specially noted, as they have been of great importance in determining the routes followed by the main roads and the railways: the Teviot and the Ettrick on the right bank, and the Gala on the left bank.

(*c*) *The Clyde.* This cuts a deep valley into the heart of the Southern Uplands, approaching the head-waters of the Annan and the Tweed, thus providing fairly easy route-ways across the Southern Uplands.

The rivers of the west coast, though numerous, are short, and not of great importance. The Stinchar, the Doon, the Ayr, and the Irvine are the chief.

On the eastern side the chief river is the Esk, between the Moorfoot Hills and the Pentland Hills.

3.—**Farming in the Southern Uplands.**

(*a*) *Cattle.* Generally speaking, most cattle are found in the western half of the region. The county of Wigtown, with its fairly large proportion of low land (see the physical map) open to the mild, moist winds from the Irish Sea, has the largest percentage of its area devoted to cattle-rearing. Next in order come the counties of Ayrshire, Dumfries, and Kirkcudbright. The counties of Selkirk and Peebles are all exceptionally low in the density of cattle. This is due, of course, to the very large proportion of high land in these counties. Berwick, although it has a fairly large proportion of low land, has not more cattle than the average for all Scotland. The reason will be seen in the succeeding paragraphs.

(*b*) *Sheep.* As in the case of both England and Wales, it is found that the counties with most cattle have fewest sheep, and vice versa. Thus the chief sheep counties in the area are Roxburgh, Selkirk, Peebles, and Berwick. This last county is more suitable for sheep than cattle because, being on the eastern side of the mountains, it is drier.

Throughout the whole region, however, the sheep "population" is above the average density for the whole of Scotland.

(*c*) *Wheat.* The climate is generally too moist and cloudy for the cultivation of wheat, even if the large proportion of high land did not preclude its extensive cultivation. The counties of Berwick and Roxburgh on the eastern side, however, produce considerable quantities. The chief areas of production are the lower valley of the Teviot, and the Merse, which is the name given to the low lands round the lower course of the Tweed.

(*d*) *Oats* is the chief cereal throughout the area, and the distribution of the crop is remarkably uniform, except, of course, on the infertile land over 1200 feet.

4.—**Mining.** The only mineral of importance is lead, which has long been mined in the Lowther Hills (sometimes called the Lead Hills). Building stone is quarried for local use. Road-metal is also quarried, the granite of Criffel in Kirkcudbright being well known.

There is a small coalfield in Nithsdale, but the output is insignificant.

5.—*The Woollen Industry.* *This industry is centred in* the valley of the Tweed. It was originally built up on local supplies of wool and abundant water power. Nowadays, however, the industry is run with coal brought in from the Midland Plain of Scotland, and much of the wool is imported. The industry has survived, in competition with the more advantageously placed mills of the West Riding, by specialising in "tweeds" of a high quality.

The chief towns engaged in the woollen industry are Hawick and Jedburgh in the valley of the Teviot, Selkirk in the valley of the Ettrick, Galashiels in the Gala valley, and Peebles and Innerleithen on the Tweed.

6.—**Routes and Towns.** All the routes of this area have for their object the connection of the densely populated Midland Valley of Scotland, with the thickly populated districts of northern England, the Midlands, and London. They are therefore mainly north-to-south routes. It is important to trace out the way in which the railways follow the valleys in their course through the mountains. The individual railway routes may best be traced from certain towns as centres, but the student should also practise working out the following "through" routes:—

(*a*) From Berwick via the east coast to Edinburgh.

(*b*) From Carlisle via Galashiels to Edinburgh.

(*c*) From Carlisle via Carstairs junction to Glasgow and Edinburgh.

(i) Berwick, though on the English side of the border, belongs [illegible] basin. It has always been important

outes :—

from Newcastle and Alnwick.

(*b*) A second line from Alnwick follows the valley of the Till, parallel to the coast, to Coldstream on the border, and joins the former route at Tweedmouth.

(*c*) A third route goes up the valley of the Tweed, through Coldstream and Kelso to Galashiels.

(ii) Galashiels controls the valley roads up the Gala, the Tweed, and the Teviot, as well as the route down the Tweed. From it railways diverge as follows :—

(*a*) Up the Gala river, over a pass between the Moorfoot and Lammermuir Hills, and down the valley of the Esk to Edinburgh.

(*b*) Southward across the shoulder of high land between the Tweed and the Teviot, then up the Teviot to Hawick, and over a rather difficult pass to the valley of the Liddel, which river it follows to its mouth, and thence to Carlisle.

(Routes (*a*) and (*b*) together form the famous Waverley Route of the London, Midland and Scottish Railway from Carlisle to Edinburgh.)

(*c*) Down the Tweed to Berwick.

(iii) Carstairs, between the western end of the Pentland Hills and the river Clyde, is important only as a railway junction. From it the following routes should be traced :—

(*a*) Southward up the Clyde, then by a high pass between the Lowther Hills and Hart Fell to the valley of the Annan, thence through Gretna over the head of the Solway Firth to Carlisle.

(*b*) North-eastward along the northern foot of the Pentland Hills to Edinburgh.

(*c*) North-westward down the valley of the Clyde, through Wishaw and Motherwell to Glasgow.

(Routes (*a*) and (*b*) together form the so-called West Coast Route to Edinburgh.)

(*d*) Eastward along the southern foot of the Pentlands, and down the valley of the Esk to Musselburgh, and so to Edinburgh.

(*e*) Westward down the valley of the river Ayr, to Ayr on the west coast.

(iv) Dumfries is situated at the lowest bridge point of the river Nith, and is the market town for the rich pastoral and agricultural district round. It controls the routes :—

(*a*) From Carlisle, via Gretna and the coastal plain.

(*b*) Up the river Nith, thence over on to the western coastal plain of Ayrshire, through Kilmarnock to Glasgow.

(*c*) The route along the south coast. This passes north of the granite mass of Criffel to the coast at Dalbeattie at the mouth of the river Urr. Thence it goes up the valley of the Dee, over by a low pass to Newtown at the head of Wigtown Bay, and so through Glenluce to Stranraer and Portpatrick. These two ports are packet stations, whence rapid steamers sail to Belfast and Larne in Ireland.

The only other important railway route in the area is that along the western coastal plain, through Girvan and Ayr to Glasgow.

III. The Midland Plain of Scotland

(See Figures 27 and 28)

1.—**Relief.** This plain lies between the Grampian Highlands on the north and the Southern Uplands on the south.

The northern edge forms a remarkably straight line, running from the northern side of the estuary of the Clyde to Stonehaven on the east coast.

The southern edge is much more irregular, extensions from the Southern Uplands invading the plain between the Clyde and the west coast on the one hand and between the Clyde and the east coast on the other.

The whole area falls naturally into four divisions according to the relief of the land. These are :—

(*a*) The belt of low land, nowhere above 600 feet in height, which runs from the Firth of Clyde to the Firth of Forth, through Glasgow and Falkirk.

(*b*) The area to the south of this, up to the line from Ayr to

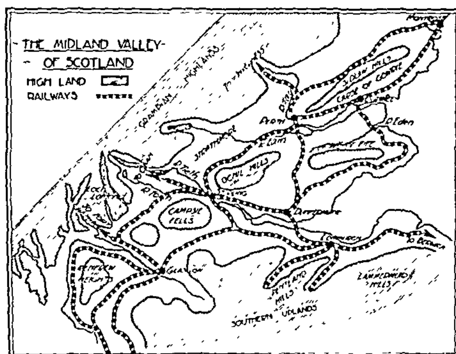


Fig 27

Dunbar, which we have taken as marking the northern limit of the Southern Uplands. This southern region may be divided into five subdivisions, viz.: (i) The western coastal plain of Ayrshire, drained by the rivers Irvine and Ayr. (ii) Clydesdale. (iii) The shoulder of high land between (i) and (ii). (iv) The eastern coastal plain around Edinburgh. (v) The extension of the Pentland Hills between Clydesdale and the eastern coastal plain.

(*c*) A discontinuous ridge of high land, running from the Firth of Clyde to Montrose on the east coast.

The following hill masses should be carefully noted :—

(i) The Renfrew Heights, between the Clyde estuary and the west coast.

(ii) The Campsie Fells and the Lennox Hills, between the rivers Clyde and Forth.

(iii) The Ochil Hills, between the river Forth and the Firth of Tay.

(iv) The Sidlaw Hills, from the northern side of the Firth of Tay to Montrose on the east cost.

(*d*) Strathmore, the "broad valley," between the Campsie–Ochils–Sidlaw line of heights and the edge of the Grampians.

Other important low lands which should be specially noted are the Carse of Gowrie, between the Sidlaw Hills and the northern side of the estuary of the Tay, and the Howe of Fife, midway between the estuaries of the Forth and the Tay.

2.—**The Rivers.** On the southern side the valley of the Clyde is all-important, not only because of the fertile low land, but also because of its industries and the facilities it offers for railway routes.

On the northern side the chief rivers are :—

(*a*) The Forth, with its important tributary the Teith, which joins the main stream just above Stirling.

(*b*) The Tay, with its tributaries the Earn, which joins the main stream just after it has opened out into its estuary, and the Isla, which joins the Tay midway between Dunkeld and Perth.

3.—**Farming in the Midland Valley.**

Cattle-farming is most important in the western part of the plain, where the climate is more moist and equable. Dairying is profitable because of the large population of the industrial districts of Glasgow and Clydesdale.

Sheep-farming is practised more particularly in the hilly lands of the Campsie Fells, the Ochils, and the Sidlaws, and the drier slopes of the Pentlands.

Cereals. This region forms the chief agricultural area of Scotland. Wheat is chiefly confined to the eastern side, where the climate is drier and more sunny. Oats is the chief crop of the western side of the plain. Barley is grown everywhere, along with wheat and oats, though Strathmore is particularly famous for this crop.

Fruits, such as apples, pears, and plums, are largely cultivated on the Carse of Gowrie and in Strathmore.

Potatoes and *root crops* are everywhere cultivated as part of the system of rotation of crops.

4.—**The Coalfields.** These are contained in great structural "basins," somewhat like the London and the Hampshire basins (though, of course, in the latter it is the chalk which is folded in the form of a basin).

The chief coalfields, as shown on the sketch-map (Fig. 28) are:

(*a*) The Ayrshire coalfield, reaching the west coast between

the towns of Ardrossan and Ayr. The coal from this field is *mainly exported to Belfast from the ports of Ardrossan, Troon, and Ayr.*

(*b*) The Lanarkshire coalfield, stretching from a little south of the valley of the Clyde to the Firth of Forth near Falkirk. This is the largest and most productive of the Scottish coalfields.

(*c*) The Clackmannan coalfield. This is really a continuation across the Firth of Forth of the Lanark coalfield.

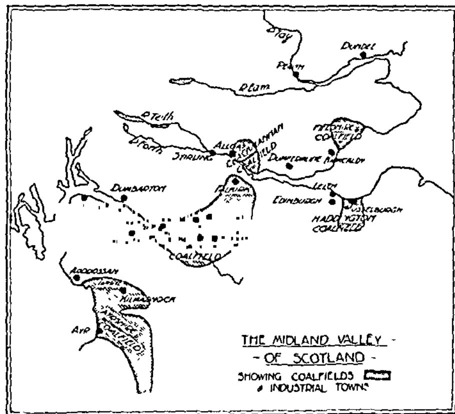


Fig. 28

(*d*) The Midlothian coalfield, near Edinburgh.

(*e*) The continuation of the above, across the Firth of Forth into Fifeshire.

Oil shale, from which paraffin, wax, and ammonia are obtained, is mined in Linlithgowshire, and particularly at West Calder.

5.—The Industries in the Midland Valley of Scotland.

(1) *The iron industry.* Iron ore occurs fairly plentifully in the coalfields, particularly in the Ayrshire coalfield, in the valley of the Clyde, and near Lanark. The presence of the iron ore in close proximity to the coal led to the early establishment of iron-smelting and steel-manufacture. These are still characteristic

industries of the Central Plain, and more particularly of the western part. The greater part of the iron is, however, now imported.

The chief centres of the iron and steel industry are :—

(*a*) Falkirk, where the famous Carron ironworks are situated.

(*b*) In Clydesdale, particularly round the valley of the tributary stream the Calder. The chief towns in this district are Coatbridge, Airdrie, Motherwell, and Wishaw.

(*c*) On the Ayrshire coalfield, particularly at Muirkirk.

(2) *Shipbuilding.* This is centred on the upper part of the Clyde estuary. The chief towns engaged in the industry are Clydebank, Port Glasgow, Greenock, and Dumbarton.

(3) *The woollen industry* is particularly associated with Alloa and Paisley.

(4) *Cotton manufacture* is carried on at Glasgow (curtains) and Paisley (cotton thread).

(5) *Flax and jute* are manufactured at Dundee on the Firth of Tay, and Dunfermline on the Firth of Forth.

(6) *Linoleum* is manufactured at Kirkcaldy and Dunfermline.

(7) *Jams and marmalade* are made at Dundee. The industry grew up originally on the local supplies of fruit from the Carse of Gowrie. The sugar was formerly obtained from the refineries at Greenock, but most of it is now imported. The oranges come chiefly from Seville in southern Spain.

(8) *Engineering* is carried on to a certain extent in all the large towns, though Glasgow, Edinburgh, and Paisley are particularly noteworthy.

(9) *Paper manufacture, printing, and book-binding* are important in Edinburgh. Ingenious geographers have traced the reason to the demands of the law courts for paper and printed matter. Whether or no this accounts for the origin of the industry, its modern success is probably due in large measure to the favourable situation of Leith, the port of Edinburgh, for the importation of wood pulp from Sweden and Norway.

6.—**Town Sites and Routes.** Here, in distinction to both the Southern Uplands and the Northern Highlands, a perfect network of railways is in existence. The great number of these railways is, of course, evidence of the greater wealth and trade of the Central Plain. The general plan of the routes is also important, as it emphasises the great importance of both east-to-west and north-to-south routes.

Glasgow is the great route-centre of the western part of the plain. From it the following routes should be traced, the student observing carefully how the directions of them are controlled by the physical features of the country :—

(*a*) South-eastward, up Clydesdale, to Carstairs junction, and thence down Annandale to Carlisle.

(*b*) Eastward along the southern side of the Lennox Hills to Falkirk, thence to Edinburgh and Stirling.

(*c*) On the northern side of the estuary of the Clyde to Dumbarton, whence routes diverge to Arrochar on Loch Long, and round the Campsie Fells and the Lennox Hills to Stirling.

(*d*) On the southern side of the estuary to Port Glasgow, Greenock, and Largs.

(*e*) Through the gap south-east of the Renfrew Heights, beyond Paisley to Dalry, thence to the coast at Ardrossan (a packet station for the islands of Arran, etc., and for Ireland). The route [illegible] Ayr and Girvan.

[illegible] *the Forth, in* [illegible] It therefore [illegible]

(*a*) Down the Firth of Forth.

(*b*) Round the eastern end of the Lennox Hills to Falkirk and Edinburgh.

(*c*) Along the northern coast of the Forth estuary to Dunfermline and Kirkcaldy.

(*d*) Westward along Strathmore to Dumbarton.

(*e*) Eastward along Strathmore to Perth.

(*f*) Up the valley of the Teith, past Callander, and thence through the Highlands to Oban.

Perth is in a very similar position to Stirling, being situated at the head of the estuary of the Tay, between the Ochil Hills and the Sidlaw Hills. The important routes are:—

(*a*) Southward to Dunfermline, thence across the Forth Bridge to Edinburgh.

(*b*) Northward to Dunkeld, then up the valley of the Tay and its tributaries the Tummel and the Garry, and down to Inverness.

(*c*) Along Strathmore north-eastward to Montrose.

(*d*) Along Strathmore south-westward to Stirling.

(*e*) Along the Carse of Gowrie to Dundee, Arbroath, and Montrose.

Edinburgh is situated in a narrow gap between the Pentland Hills and the coast. It therefore controls the routes both west and east along the coastal plain (to Falkirk and Berwick respectively), southward via the "Waverley" route to Carlisle, and northward via the Forth Bridge to Dunfermline and the north of Scotland.

Dundee is in a very similar position on the Carse of Gowrie.

7.—**The Ports.** The trade of Glasgow is naturally concerned chiefly with America. The chief imports are food-stuffs, particularly wheat, flour, meat, and fruit, and raw materials,

such as iron ore and cotton. The exports are such as are provided by the industries of the locality, viz. iron and steel goods, ships, machinery, cotton goods, and whisky.

Leith is the port for Edinburgh; it is of much less importance than Glasgow. Its trade is chiefly with Norway, Sweden, Russia, Denmark, and Germany, which countries face it across the North Sea. The imports are mainly food-stuffs, particularly wheat and flour, dairy produce (butter, cheese, eggs), timber, paper, and wood pulp.

Grangemouth, Alloa, and Bo'ness are small ports on the Firth of Forth, chiefly engaged in the export of coal and the products of the oil shale.

Rosyth is a naval station near the northern end of the Forth Bridge.

Dundee trades mainly with the countries which face it across the North Sea, with the Mediterranean countries, and with India. From Russia, Holland and Belgium she imports flax for her linen industry; from India, jute for the making of sacking; from Norway and Sweden, timber; from Spain and the Mediterranean countries, oranges and other fruits for her jam factories. The chief exports are again those provided by the local industries, viz. sacks and bags made from jute, and linen goods.

St. Andrews is a famous university town at the mouth of the river Eden, which drains the low land known as the Howe of Fife.

Cupar is the capital of Fifeshire, in the centre of the same fertile agricultural area.

Arbroath and Montrose are fishing ports which belong rather to the coastal belt of the Highland region.

IV. The Grampian Highlands. (See Figure 29)

RELIEF AND RIVERS

(1) *The boundaries* of this region are, on the south, the "Highland line" already noted, running from the Firth of Clyde to Stonehaven; on the north, the deep valley of Glenmore. This latter begins with the Firth of Lorne and Loch Linnhe on the west coast, and is continued through the fresh-water lakes of Loch Lochy, Loch Oich and Loch Ness, to the Moray Firth.

(2) *The Western coast* is very rugged, being broken up by long, narrow sea-lochs (e.g. Loch Fyne and Loch Long), and diversified by long peninsulas like that of Kintyre, and by lines of islands which continue the mountain-ridges of the interior—e.g. the islands of Jura and Islay, which are separated from the peninsula of Kintyre by the Sound of Jura.

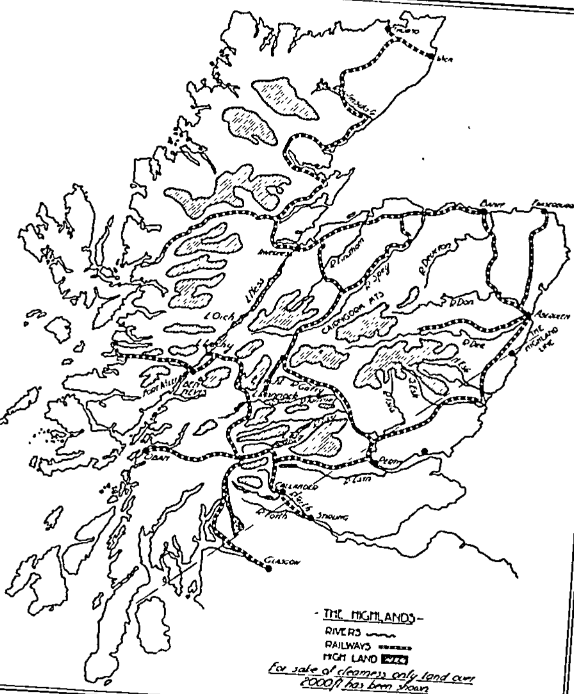

BANFF
INVERNESS
L Ness
R Spey
CAIRNGORM MTS
R Don
ABERDEEN
THE HIGHLAND LINE
R Dee
L Oich
L Lochy
Fort William
Ben Nevis
OBAN
PERTH
CALLANDER
R Forth
STIRLING
GLASGOW
- THE HIGHLANDS -
RIVERS
RAILWAYS
HIGH LAND
For sake of clearness only land over 2000 ft has been shown

Fig 29

lower land, through Huntly, to reach the coastal plain again at Elgin and Banff. Thence the railway continues keeping very close to the 600-feet contour-line through Forres and Nairn to Inverness. Branch lines run from Aberdeen: (*a*) northward to Fraserburgh, with an offshoot to Peterhead; (*b*) westward up the valley of the Dee to Ballater, whence a good motor road continues to the royal seat of Balmoral.

Another branch line runs to the coast at Banff, from which place a coastal route crosses the river Spey, and continues, to join the main route again at Elgin.

(The student should note how, in this region, the railways have "struck a balance" between the following factors:—

The easiest route would have been along the coast; the shortest route would have been direct from Aberdeen to Inverness. The mountains prevent the latter course from being adopted, and the actual main line runs about half-way between the shortest and the easiest route. Had the towns of the north-east coast been of greater importance they would have drawn the main line through them, instead of being served, as at present, by only branch lines.)

(2) From Perth a second main line to Inverness follows the valleys of the Tay, the Tummel, and the Garry, past Dunkeld and Blair Atholl, thence by a high pass at the head of Glengarry to the stream which issues from Loch Ericht. The railway then follows the valley of the Spey for some distance, and eventually cuts across the high land by a difficult route across the valleys of the Findhorn and Nairn to Inverness.

(3) From Stirling a railway ascends the valley of the Teith through Callander, thence through a fairly low pass by the head of Loch Earn into the valley of the upper Tay. From the head of Glen Tay the railway continues westward, around the northern end of Loch Awe, to Oban, on the southern side of Loch Linnhe.

(4) From Glasgow a line follows the low land on the northern side of the Clyde estuary, through Dumbarton and Helensburgh, thence up the eastern side of Loch Long and northward by a series of difficult passes, until it emerges from the Highlands down Glen Spean. The railway follows the southern side of Glen More to Fort William, and thence turns westward to Arisaig and Mallaig on the Sound of Sleat, opposite the Isle of Skye.

V. The Northern Highlands. (See Figure 29)

1.—**Relief and Rivers.** This is the highland mass north of Glenmore. It reproduces the chief characteristics of the Grampian Highlands, though the mountains nowhere reach a height of four thousand feet.

There are two areas of low land—one around Moray Firth, Cromarty Firth, and Dornoch Firth, and the second around the north-eastern angle of Caithness. The rest of the area is mountainous, with

The chie … it Moray Firth. … e general direction of the glens and lakes should be noted: e.g. in the southern part the valleys run from south-west to north-east, parallel to Glenmore; in the northern part they run from north-west to south-east (e.g. Loch Shin).

On the western side the rivers are shorter and more rapid. Here again two main valley directions may be noted: from east to west in the southern part of the region, and from south-east *to north-west in the northern part.*

Note, too, how the sea-lochs follow the same directions (e.g. Loch Broom).

The only railway routes in this area are:—

(*a*) From Inverness to the head of Moray Firth; thence to the head of Cromarty Firth, cutting off the peninsula of high land known as "Black Isle"; thence up the valley forming the exit from Loch Shin; then eastward through Lairg to the coast at Golspie. From near the Ord of Caithness the railway runs up the valley of the river Helmsdale into Caithness, separate branches running to Thurso on the north coast and Wick on the east coast.

(*b*) From Dingwall, at the head of Cromarty Firth, a cross-country line runs eastward by a remarkable through valley which is nowhere above 300 feet in height, to Strome Ferry, on the Kyle of Lochalsh, opposite the Isle of Skye.

(*c*) The railway from Fort William to Mallaig has already been mentioned in the preceding section.

2.—**Farming in the Highlands.** (The succeeding sections refer to both the Grampians and the Northern Highlands.)

The large area of high, infertile land precludes any possibility of a highly developed farming industry.

The eastern coastal plain, however, presents a marked contrast to the rest of the Highland area. Here fertile soil, a dry climate, and rather warm, sunny summers allow the cultivation of oats, barley, and root crops. Even wheat is cultivated to a moderate extent.

For the rest, the barren mountain-sides and the deep glens are practically useless from an economic point of view. Formerly the region did support, in a poor fashion, a rather larger population than at present; but emigration, often compulsory, has left the land derelict, or of use only for deer forests.

Even sheep-rearing is not very profitable on the cold, bleak,

and damp mountain-sides. Thus Inverness has only about half as many sheep in proportion to its area as the rest of Scotland, while Ross and Cromarty have even less.

Cattle do not thrive, with the exception of the hardy shaggy-haired Highland cattle. Here again Inverness has far fewer cattle per acre than the rest of Scotland. Aberdeenshire, however, with its larger proportion of low land, has about twice as many cattle per acre as the average for Scotland; while the counties of Kincardine, Banff, Elgin, and Nairn are, for the same reason, noteworthy cattle-rearing areas.

3.—**Fisheries.** The infertility of the land has driven men to the sea. Herring, cod, haddock, whiting, sole, plaice, and turbot are the chief kinds of fish caught. The chief fishing centres are, from north to south :—

Wick, chiefly engaged in herring fisheries, though flat fish and oysters form a valuable addition.

Peterhead, again principally engaged in the herring fisheries.

Aberdeen, which, though largely interested in the herring fisheries, specialises in cod, haddock, etc.

Fraserburgh, chiefly engaged in the herring industry.

In addition there are numerous villages and small towns whose main source of livelihood is the fishing industry. The curing of the fish, particularly the herrings, forms an important industry in all the coastal towns of this region.

4.—**Other Industries.** Under this heading may be mentioned :—

(*a*) The granite quarries of Aberdeen and Peterhead.

(*b*) The smelting of aluminium ore at Foyers, near Fort Augustus, at the head (south-western end) of Loch Ness; and at Ballachulish, on the southern side of Loch Linnhe. The ore, which is imported, is smelted by electricity derived from the water power supplied by the mountain streams.

VI. The Orkney Islands

These are separated from Caithness by Pentland Firth, a strait about ten miles broad. The passage of the firth is rendered dangerous by the strong tidal current which frequently " races " through it. The land is on the whole low, being under 300 feet. On the coast, however, especially in the island of Hoy, the sea has cut vertical cliffs hundreds of feet high, as well as many detached pinnacles of rock known as " stacks " (e.g. The Old Man of Hoy).

The largest island is known as Pomona or Mainland. Between it and the island of Hoy to the south is the enclosed harbour Scapa

Flow, which was the headquarters of the British Fleet during the Great War.

The chief occupations of the people are fishing and sheep-rearing. Some agriculture is carried on, but only about one-twentieth of the population is engaged in this industry. Weaving of woollen cloth from the local wool is still carried on in the cottages.

The only important town is Kirkwall, on Mainland, which is engaged mainly in the fishing industries.

VII. The Shetland Islands

Lying fifty miles north of the Orkneys, these form somewhat of a contrast to the latter. Whereas the Orkneys are comparatively low, the Shetlands are high and rugged, being formed of ancient, hard, crystalline rock. Mainland is again the name of the chief island. The occupations are the same as in the Orkneys, viz. fishing, sheep-rearing, the weaving of woollen goods, and some agriculture. The Shetland wool is particularly famous for its softness and beauty of texture. The small Shetland ponies are also characteristic of the cold climate.

The only important town is Lerwick, a fishing centre on the eastern side of Mainland.

VIII. The Hebrides

These are the groups of islands on the western side of Scotland. They are divided, by the deep straits of the Minch and the Little Minch, into two groups.

The Outer Hebrides consist of the kite-shaped group of islands: Lewis (the southern portion of which is named Harris), Benbecula, North Uist, South Uist, Barra Island, and a small group ending in Barra Head on the south.

The islands are composed of very ancient rock, which has been swept almost clear of soil by the glaciers of the Great Ice Age. The climate is damp, though the absence of very high mountains makes the rainfall less than that of the mainland of western Scotland. Consequently agriculture is very little practised, and the people are desperately poor. The only industries are fishing, sheep-rearing, and cattle-farming, eked out by a little agriculture (oats and potatoes). The weaving of woollen goods is again an important industry, carried on in the homes of the people. The Harris tweeds are justly prized for their warmth and wearing quality. The only town is Stornoway.

The Inner Hebrides comprise the islands of Skye, Rum, Eig, and Mull, off the coast of the Northern Highlands, and Jura

and Islay, on the southern side of the Firth of Lorne. islands are formed chiefly of lava (rock which has been poured in a molten condition from volcanoes). When this lava co it often formed many-sided pillars of rock. Fingal's Cave on island of Staffa (a little to the west of Mull) is famous for tl pillars.

The industries of these islands are the same as those of Outer Hebrides and the Orkneys, except that there is little ho manufacture of woollen cloth.

The chief town is Portree in Skye, a fishing centre on the coast. Communication between Skye and the mainland is ferry-boat from Mallaig and the Kyle of Lochalsh.

IX. Islands of the Firth of Clyde

The chief of these are Bute and Arran. The former is known as a holiday resort, Rothesay being a famous centre tours of the lochs by steamers. The island of Bute is separa from the mainland by the famous narrow strait known as Kyles of Bute.

The island of Arran is rather unproductive, but is also known as a holiday resort. It is fairly mountainous, rising Goat Fell to 2866 feet. The only town of importance is Bro on the east coast.

Chapter IX

IRELAND

RELIEF AND RIVERS

(See Figure 30)

IRELAND is separated from England by St. George's Channel and the Irish Sea, and from Scotland by the North Channel. The mountainous regions of Ireland do not divide the country into such clearly marked sections as in the case of Britain, but the following points should be noted :—

(1) The mountains are chiefly near the coast, so that Ireland may be pictured as a great saucer, the raised edge representing the mountains. This edge is, of course, "chipped" by the river valleys which break through.

(2) On the basis of relief the island may be divided into four sections: (*a*) the northern mountains; (*b*) the western high land; (*c*) the southern mountains, with (*d*) the midland plain lying between them.

(*a*) In the north the following elevated regions and plains should be carefully noted :—

(i) The Mourne Mountains in County Down; the mountains of Antrim, enclosing between them the low land drained by the river Lagan, and the low land which forms the eastern half of County Down.

(ii) The low land round Lough Neagh, drained by the river Bann, which flows northward to the sea at Coleraine.

(iii) The Sperrin Mountains in Tyrone and Londonderry, and the mountains of Donegal, enclosing between them the low land drained by the river Foyle.

To the south of the Donegal mountains is the low land occupied by the Upper and Lower Loughs Erne, which are drained by the river Erne to Donegal Bay.

(*b*) In the west the mountainous region forms the two large peninsulas of Mayo and Galway, with Clew Bay between them. Note particuarly the mountainous region of Connemara on the south.

The Slieve Aughty range is a somewhat isolated mass in the south-east of Galway.

(*c*) In the south, the Wicklow Mountains, near the east coast, are the counterpart of the Welsh mountains.

Westward from the Wicklow Mountains lie the more or less

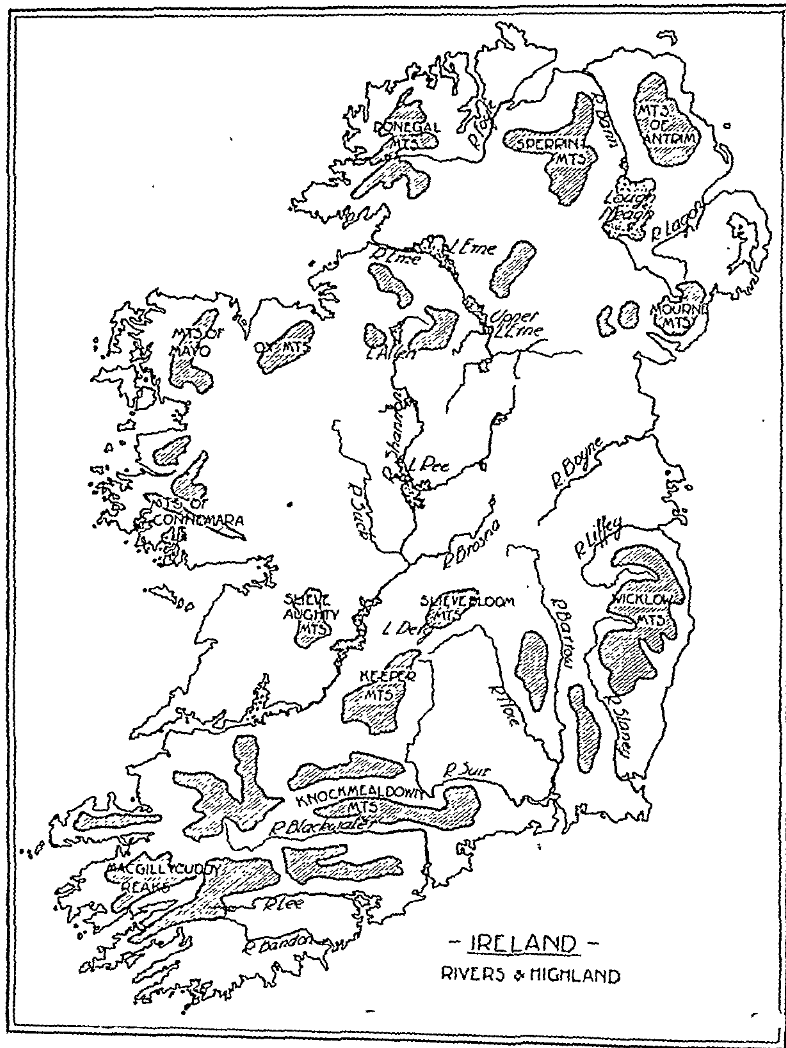


Fig. 30

parallel ranges of Kilkenny and the Slieve Bloom Mountains, with the valleys of the Slaney (entering the sea at Wexford), the Barrow, and the Nore (entering the sea at Waterford) forming parallel lowland areas.

In the south-west the mountain ridges run nearly east and west. Note the Galty Mountains, the Knockmealdown Mountains,

and the famous tourist centre of Killarney. On the south-west coast the mountain ranges form long, high peninsulas, enclosing between them the parallel bays, Dingle Bay, Kenmare Bay, Bantry Bay. These bays are continued eastward by the parallel valleys of the river Blackwater (which turns southward to reach the sea at Youghal), the Lee, which enters the sea in Cork Harbour, and the Bandon, with Kinsale at its mouth.

(*d*) The Midland Plain runs out to the coast on the east, forming the low coastline between Dundalk Bay and Dublin Bay. (Note the river Fane, entering the sea near Dundalk; the Boyne and its tributary the Blackwater, with Drogheda at its mouth; and the Liffey, which, rising in the Wicklow Mountains, pursues an almost semi-circular course to enter the sea at Dublin.

The drainage of the rest of the Midland Plain is by the river Shannon. The divides between the rivers are everywhere indefinite, and the streams themselves often swell out to make lakes.

The Shannon is the longest river in the British Isles. It rises within thirty miles of Donegal Bay on the north-west coast, in a range of hills near Lough Allen. The exit from this lake is only 167 feet above sea-level, so the river has a remarkably slow course over the plain. It spreads out into many lakes, of which the chief are Lough Ree and Lough Derg. Its chief tributaries are the river Brosna, draining the Midland Plain from the east, and the river Suck, draining the plain of Connaught from the west. It leaves Lough Derg at a level of 116 feet, having fallen only 50 feet from its exit from Lough Allen to the exit from Lough Derg. South-west of Lough Derg the river flows more rapidly, in a comparatively narrow passage between the Slieve Bernagh and the Silvermine Mountains. Below Limerick the river opens out into its long estuary.

On the southern side of the estuary, between the Slieve Felim *Mountains and the Galty Mountains, is the fertile Golden Vale of* Limerick.

THE CLIMATE

1.—**Winds and Rainfall.** Ireland is in the full track of the prevalent south-westerly winds from the Atlantic. It has, in consequence, heavy rainfall at all times of the year, particularly in the mountainous districts in the south-west and west.

The rainfall gradually diminishes eastward so that the whole eastern half of the island has less than 40 inches of rain, with the exceptions of (*a*) the mountainous belt on the south-east, from the Knockmealdown Mountains to the Wicklow Mountains; (*b*) the

Mountains of Mourne and of Antrim in the north-east, where the greater elevation of the land compels the wind to rise, and so causes increased condensation of the water vapour in the air.

County Dublin, in the middle of the east coast, has only 25 to 30 inches of rain per year, an amount equal to that of the Midland Plain of England. The reasons for this comparatively low rainfall are: (*a*) it is situated on the eastern side of the island, in the shelter of the western mountains; (*b*) it is low-lying land, so the winds are not compelled to rise and lose their moisture.

Note that Ireland is, on the whole, wetter than England, though there are no parts which have the very heavy rainfall of the Lake District and North Wales, and no parts with the very low rainfall of eastern England.

2.—**Temperature.** Note the following points on the isotherm map:—

In January. (1) The interior is colder than the coast, the area below 40° F. nowhere reaching the sea, though it is situated much nearer the north-east coast than the south-west coast.

(2) The south-west coast of Ireland is the warmest part of the British Isles in winter time, being six degrees warmer than London, which is on the same latitude. (The actual temperatures are 45° F. for south-western Ireland, and 39° F. for London.)

(3) The temperature in Ireland decreases from the south-west to the north-east.

All the above facts may be connected with the prevalent winds from the south-west. Coming from the sea, they are not only moist, but also relatively warm; hence the warmest parts in winter are those which first receive the warm south-westerly winds, while the coldest part, around Lough Neagh in the north-east, is the one furthest removed from the south-west coast. (Note, however, that the occasional winds from the east and north-east make the actual coast-lines in eastern and northern Ireland a little warmer than the interior.)

In July the course of the 60° F. isotherm should be carefully noted. Observe that:

(4) The warmest part of Ireland in summer is in the south-eastern half of the country (compare the south-eastern half of England).

(5) The temperature of the interior is higher than that of the coast (e.g. Galway Bay 58° F., centre of Ireland a little over 60° F.).

(6) The east coast is a little warmer than the west coast (e.g. Galway Bay 58° F., Dublin 60° F.). Here again the influence of the westerly winds may be traced. Coming from the sea they are cooler than the land in summer (though warmer in winter).

Hence the coolest parts in summer are the western and south-western districts.

Summing up these facts, we note that:

(7) South-western Ireland has a remarkably equable climate, being mild in winter and cool in summer.

(8) The interior and the south-east have a rather more extreme climate, being colder in winter and warmer in summer.

Comparing Ireland with England, however, we find that:

(9) Ireland as a whole is much more equable than England, the only part with a range of temperature over 20° F. being the very middle of the Irish Plain. Indeed, the characteristic climate of Ireland may be stated to be equable and moist.

VEGETATION

1.—**Grass-land.** This is the characteristic natural vegetation of Ireland, which on that account is often called "The Emerald Isle." The reasons for the luxuriant growth of grass are to be found in the mild, moist, equable climate.

2.—**Heath-land.** The high lands of the south-west, the west, and the north are mainly infertile, being covered with coarse grass, bare rock, and sparse forests.

3.—**Bogs.** The Midland Plain of Ireland is so low-lying, and [illegible] island. These bogs were originally lakes and stagnant pools; in them grew rushes and marsh-grasses, which have eventually choked up the whole lake. The decayed stems, roots, etc., have accumulated to form the peat which is dug for fuel.

POLITICAL DIVISIONS

Ireland has now two separate governments.

1.—**Northern Ireland** consists of the counties Down, Armagh, Fermanagh, Tyrone, Londonderry, and Antrim. The capital of Northern Ireland is Belfast.

2.—**The Irish Free State** comprises the rest of Ireland. It has a status somewhat like that of the great Dominions of Australia and Canada. Its capital is Dublin.

The detailed geography of Ireland *will therefore be* described on the basis of these political divisions. This is also advisable because Northern Ireland presents many contrasts, particularly from the point of view of economic and commercial geography, with the Irish Free State.

NORTHERN IRELAND. (See Figure 31)

The general geography, the physical features, and the climate have already been described in the foregoing sections. These should be again read over by the student so that he will be able to include them in any description of Northern Ireland.

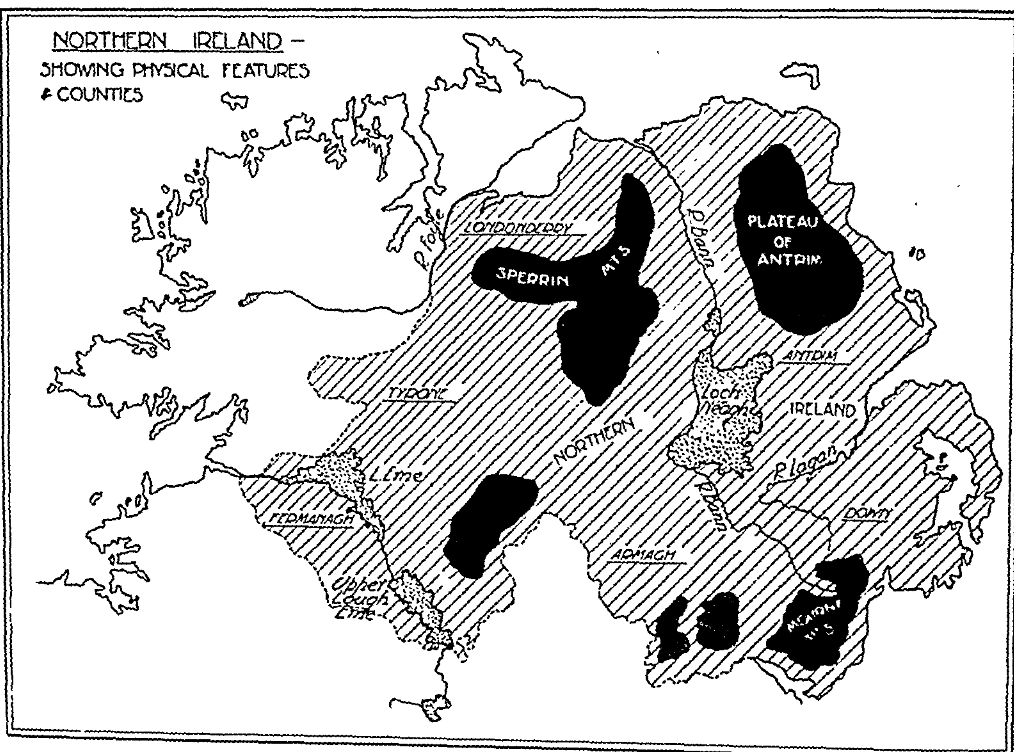


Fig. 31

1.—Farming in Northern Ireland. The north-eastern district between Carlingford Lough (on the east coast, latitude 54° N.) and Lough Foyle (on the north coast, longitude 7° W.) is much the most fertile region in Ireland. About 80 per cent. of its area is cultivated, though only about one-quarter of that is ploughed land, the rest being grass-land and meadow. The chief crops are oats, barley, potatoes, and flax.

(Note that wheat is not very much cultivated, because of the cloudiness and dampness of the climate.)

Flax is the plant from which is obtained the fibre which is spun to make linen. This region is practically the only part of Britain where the crop is grown.

Cattle-rearing and dairy farming are widely practised, especi-

ally on the low lands round Lough Neagh and Londonderry. The valley of the Lagan, around Lisburn, is also one of the most note- [illegible] Britain.

[illegible] A small coalfield exists near Dungannon in Tyrone. The output is very small, and, although the coal seams are said to extend under Lough Neagh, the region will probably never be very important as a coal-mining area.

(*b*) Iron ore is found among the lava-beds of Antrim. The iron is, however, sent across to Scotland or to Barrow for smelting.

(*c*) Aluminium ore (or bauxite) is found near Ballymena (north of Lough Neagh) in County Antrim. It is mined or quarried and some of it sent across to Scotland for smelting at Ballachulish and Foyers (see previous note under the heading of " The Northern Highlands " of Scotland). The chief use, however, is for the production of alum.

(*d*) Stone. Granite for setts and road-metal is obtained from the Mourne Mountains.

Basalt. This is rock which was poured out on the surface of the earth as hot, liquid lava. It makes up the greater part of the plateau of Antrim. On the north coast, at Giant's Causeway, it has formed, on cooling, hexagonal pillars, similar to those mentioned in Fingal's Cave (see island of Staffa, under the heading of " The Hebrides " in the section on Scotland).

Giant's Causeway is, of course, an object of great interest to tourists. The pillars of basalt are quarried and used for the construction of sea-walls, etc.

3.—**Routes and Towns.** (1) The chief sea-entries are :—

Belfast, the great commercial port of Ireland, at the head of Belfast Lough.

Larne, the packet station on the North Channel, opposite Stranraer and Portpatrick in south-west Scotland. (This forms the shortest route from Great Britain to Ireland.)

Portrush is the packet station near the mouth of the river Bann.

Londonderry, at the head of Lough Foyle, has some importance as a port, and holds the gateway to the interior.

Moville, at the seaward end of Lough Foyle, though not in the political division of " Northern Ireland," is a kind of outport for Londonderry, being the port of call for ocean liners.

Newry has a somewhat analogous position to Londonderry, holding as it does the gateway leading from the sea, between the Mountains of Mourne and the Slieve Gullion mass on the east to the lowlands round Lough Neagh. Greenore, again not in " Northern Ireland," is the modern packet station. It is situated near the end of the peninsula between Carlingford Lough and Dundalk Bay, and has steamer services to Holyhead in North Wales.

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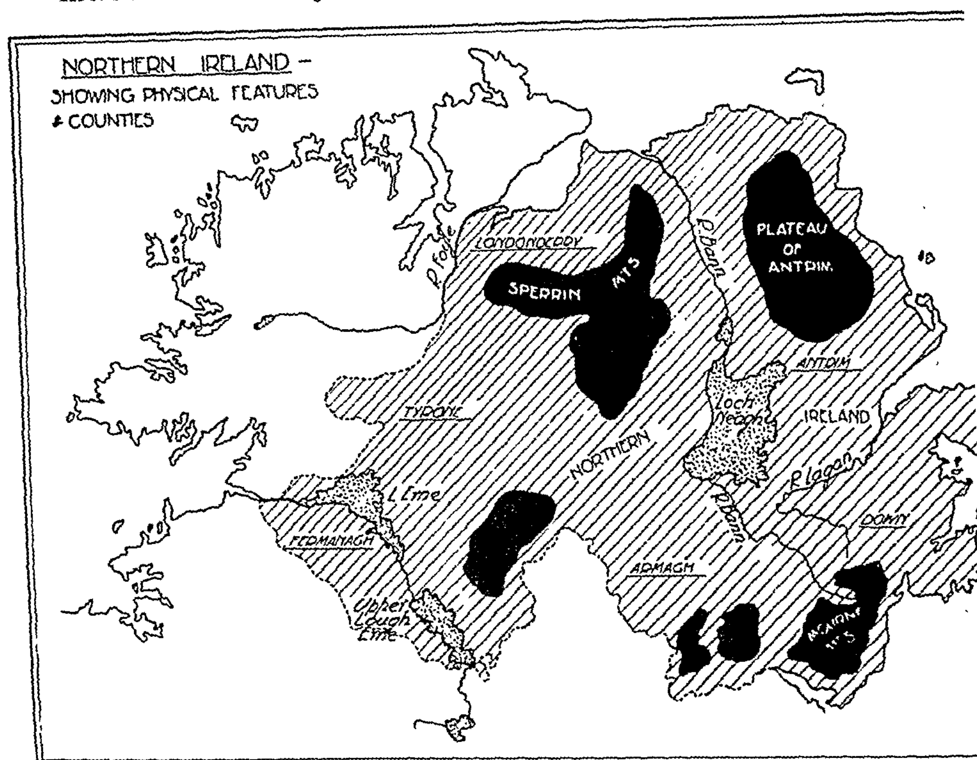


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ally on the low lands round Lough Neagh and Londonderry. The valley of the Lagan, around Lisburn, is also one of the most noteworthy cattle-rearing districts of Britain.

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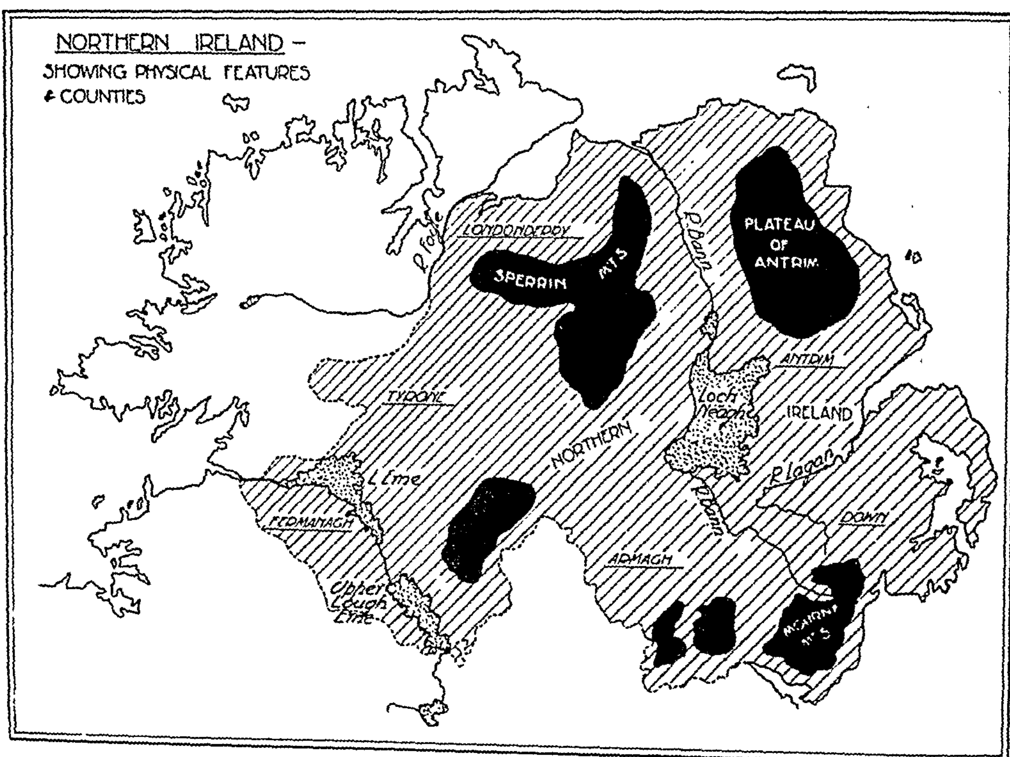


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(2) *The Railway Routes*. These should be traced on the map with reference to the high land, the valleys, and the sea-entries named in the previous paragraph.

(*a*) From Belfast routes lead in the following directions :—

(i) Up the valley of the river Lagan to Portadown, south of Lough Neagh; (ii) northward, along the coastal plain of Belfast Lough, to Carrickfergus and Larne; (iii) southward, between the Mourne Mountains and the coast, to Downpatrick and Newcastle.

(*b*) From Larne routes lead (i) to Belfast; (ii) on the south of the Antrim mountains to Antrim at the north-eastern corner of Lough Neagh, and thence northward parallel to the river Bann to Ballymena, Coleraine, and Portrush.

(*c*) From Newry lines run (i) northward to Portadown and thence to Londonderry; (ii) north-westward to Armagh and thence to Bundoran on the west coast.

(*d*) From Londonderry three railways diverge: (i) along the north coast to Coleraine; (ii) up the river Foyle to Lifford, and thence south of the Sperrin Mountains to Portadown; (iii) up the river Foyle and its tributary the Mourne, thence to Enniskillen between Upper and Lower Loughs Erne.

When the student has traced these out for himself on the map he will realise not only why the railways follow these directions, but also the influence of these routes, even in the days before railways, in determining the sites and importance of the various towns named. He should practise drawing sketch-maps on a fairly large scale showing why towns have grown up in certain places. Note that in such maps, which should always be included in answers to examination questions, it is necessary to show not only coast-line, rivers, and railways, but also the high land and the destinations of the routes.

The student should now trace out the great through routes, as follows :—

(*a*) From Belfast, through Portadown to Londonderry, to Bundoran, and to Dublin.

(*b*) From Larne to Londonderry.

(*c*) From Newry to Londonderry and Belfast.

The railway routes should always be memorised from the above two points of view, i.e. (*a*) as local routes, explaining the site and importance of the towns which form important junctions; (*b*) as through routes, giving a wider view of transport and communication within the whole region.

4.—**Industries of Northern Ireland.** *Shipbuilding*. This is chiefly carried on in the Belfast district. The iron has to be imported, but the local initiative, cheap land, abundant labour

supply, and facilities for launching have made it possible to counteract this disadvantage.

The linen industry is also characteristic of the Belfast area. The local flax is used, but large quantities are also imported from Russia and Belgium.

The large spinning and weaving factories are situated chiefly in Belfast. Londonderry is concerned chiefly in the making up of the woven linen, while shirt-making, etc., is carried on all over the area in the small towns and villages.

Brewing and the distillation of spirits is carried on in Belfast.

Miscellaneous industries, including engineering, tobacco manufacture, and rope-making, are carried on in Belfast and Londonderry.

The Trade of Belfast.—The trade is chiefly concerned with the English and Scottish ports which face it. The imports consist mainly of flax and wheat; the exports are ships, linen goods, manufactured tobacco, and live cattle. The total amount of trade is comparatively small.

THE IRISH FREE STATE

Natural Divisions.—For purposes of geographical description this state may be divided into six natural regions. They are:—

1. *The Mountains of Donegal* in the north-west.
2. *The Western Highlands* in Mayo and Galway.
3. *The Midland Plain.*
4. *The Lower Shannon,* including the counties of Clare and Limerick.
5. *The South-east,* including the Slieve Bloom Mountains, the mountains of Wicklow, and the basins of the rivers Nore, Barrow, and Slaney.
6. *The South-western* mountains and valleys.

1.—**Donegal.** *Relief.* The mountains, which run from south-west to north-east, attain a height of 2000 feet, and leave little low land. On the coast are high cliffs, 1000 feet above the sea.

Soil. The rock is mainly hard and crystalline, like that of the Northern Highlands of Scotland. Hence the soil is thin and infertile.

Farming. Owing to the infertility of the soil, very little agriculture can be carried on, though oats are grown in some of the sheltered valleys. Cattle, sheep, and pigs form the chief means of subsistence.

Fishing. Small fishing villages are situated round the stormy coasts. The fisheries are, however, of importance only as adding to the scanty food supply of the inhabitants. Practically

none is exported, owing to the lack of adjacent centres of dense population.

Weaving. A little weaving of woollen cloth is still carried on in the homes of the people. "Donegal tweeds," like the "Harris tweeds," are famous for their hard-wearing qualities.

Towns. Donegal, on the bay of the same name, is the only town of importance.

2.—**The Western Highlands.** This mountainous region is divided into two parts by Clew Bay. The economic geography of the area is very similar to that of Donegal. The inhabitants wrest a poor livelihood from the thin, infertile soil by keeping a few cattle, sheep, and pigs, and by weaving woollen cloth. The men add a little to their income by going over to England in summer as harvesters.

On the coast, fishing is carried on to supply the local population.

There are no towns of importance, and the population is scanty.

3.—**The Midland Plain.** This, being low land, is more fertile and more densely populated than the above areas. The fertility and the density of population increase towards the east. The chief points of the economic geography may be summarised as follows :—

(*a*) On the east coast. Three important entries to the Midland Plain are Dundalk, Drogheda, and Dublin, from which railways radiate to the rest of Ireland.

Dublin, the capital of the Irish Free State, has become most important because it has both the best harbour and the best access to the interior. It has some industries, of which the chief are the manufacture of whisky from the barley grown in the vicinity, the brewing of beer, and the manufacture of textiles.

Kingstown, near the open sea on the southern side of Dublin Bay, is the packet station, with steamer service to Holyhead.

(*b*) The counties of Dublin, Louth, and Meath are among the most fertile in Ireland. Dairy farming is an important industry, the counties having more cattle per acre than most counties of Britain. The chief cereals are oats and barley (the latter used for distilling and brewing). The drier climate (see notes under "Rainfall") enables some wheat to be grown.

In consequence of all these factors the density of population is higher than in any other part of the Irish Plain.

(*c*) Westward of this fertile area, in the counties of Longford, West Meath, and King's County, the land is given up mainly to cattle-rearing, as the surface is to a great extent water-logged. Some sheep are kept, but only on the higher ground.

The peat of the bogs is used for fuel, and is dried for use as bedding for cattle, and attempts have been made to obtain ammonia from it by distillation. At the bottom of some of the lakes a small quantity of bog iron ore is found.

Athlone, on the Shannon, is the chief town.

(*d*) West of the Shannon the land is less fertile, though cattle-rearing is still the staple industry.

The low land extends to the west coast at Galway Bay, Clew Bay, and Sligo Bay. Here are situated the ports of Galway, Westport, and Sligo respectively, all of them termini of railways from Dublin, and all on good harbours. The lack of industries and a dense population in the Central Plain behind has, however, restricted their growth, and they are little more than fishing villages.

The western boundary between the Midland Plain and the Western Highlands is formed by the loughs Corrib, Mask, and Conn.

4.—**The Lower Shannon.** A great contrast is to be observed between the low lands to the north and to the south of the Shannon estuary. County Clare to the north, though shown on the map as low land below 600 feet, is really composed mainly of many low, barren hills, on which no kind of farming is profitable.

The Golden Vale to the south, however, has a mixed soil of greater fertility. This is one of the chief dairy-farming regions of Ireland, while oats and barley are also grown.

Limerick is the port at the head of the Shannon estuary. It exports butter and brews beer.

5.—**The South-east.** This is a rather diversified area. The barren highlands of the Wicklow Mountains provide hardly any economic product except granite, and the other mountainous regions are very similar. The intermediate valleys are, however, fairly fertile. Cattle, sheep, and pigs are kept, and barley and oats are grown. A little coal is mined in the valley of the Barrow.

The outlets of the region are Wexford (with its modern outport of Rosslare, which is the packet station connected with Fishguard in South Wales) and Waterford. Both export bacon and dairy produce.

6.—**The South-west.** This comprises the counties of Kerry, Cork, and Waterford. The mountainous ridges are naturally barren, being covered mainly with heath. The valleys are, however, very fertile, and make this region one of the most important dairying districts in the British Isles.

The outlets are naturally on the east, where the long west-to-east valleys open to the sea.

Cork is the most important town in the region. It is situated

on an excellent land-locked harbour. Its exports are chiefly butter, bacon, and whisky; its imports, wheat and feeding stuffs for the cattle.

Queenstown is situated near the entrance to the harbour, and is capable of accommodating large ocean liners.

Waterford, at the mouth of the Suir, may also be considered as an outlet for this region.

Tralee, on the west coast, is the centre of a rich dairying district, and exports butter.

Valentia Island, off the middle peninsula of Kerry, is noteworthy as being the starting-point of the Transatlantic cable to America.

The Killarney district, drained by the river Laune to Dingle Bay, is a famous tourist centre.

THE RAILWAYS

The chief railway routes of the area radiate from Dublin. The following lines should be carefully traced on the map :—

(*a*) From Dublin, through Mullingar and Longford to Sligo.

(*b*) From Dublin, through Mullingar to Galway, and on to Clifden, the wireless station on the coast of Connemara.

(*c*) South-eastward from Dublin, through Maryborough in Queen's County to Mallow and Cork.

(*d*) Round the coast from Dublin, northward to Dundalk, and thence north-eastward through Clones to Donegal Bay.

(*e*) Round the coast southward from Dublin, through Kingstown, Wicklow, Avoca, to Wexford, then along the south coast to Waterford and up the river Blackwater to Lismore and Mallow.

CANALS

The flat Midland Plain has facilitated the making of canals. The chief of the Irish canals are :—

(*a*) The Royal Canal, from Dublin to the upper end of Lough Ree.

(*b*) The Union Canal, from Lough Neagh to Upper Lough Erne.

(*c*) The Grand Canal, from Dublin to the Shannon at its confluence with the river Brosna.

(*d*) The Newry Canal, from the sea at Newry to Lough Neagh.

PACKET STATIONS IN IRELAND

The following table gives the chief packet stations, with the distances, between Ireland and Great Britain:—

Irish Port	British Port	Distance
Larne	Stranraer	35 miles
Belfast	Heysham	115 ,,
Belfast	Liverpool	140 ,,
Greenore	Holyhead	70 ,,
Kingstown	Holyhead	62 ,,
Rosslare	Fishguard	55 ,,
Queenstown	Fishguard	135 ,,

map of Europe). The Balkans continue the line on the south of the Danube. The Caucasus Mountains between the Black Sea and the Caspian Sea must also be considered a part of this great mountain line.

In addition to the above ranges of mountains there are certain elevated "blocks" of land which form plateaux. The chief of these are :—

(i) The Bohemian Plateau, whose edges are formed by the Ore Mountains and the Giant Mountains.

(ii) Plateaux on each side of the Rhine, such as the Vosges.

(iii) The Central Plateau (the Auvergne) in France, of which the Cevennes is the steep eastern side.

(iv) The plateau of Spain and Portugal, between the Cantabrian Mountains on the north and the Sierra Nevada on the south-east.

(v) The Rhodope Mountains of the Balkan peninsula, between the Balkans and the Pindus Mountains.

Three lowland basins, or plains, should also be noted in this region. They are :—

(i) The plain of Hungary, between the Alps, the Illyrian Alps, and the Carpathians.

(ii) The basin of the Po, in northern Italy, between the Alps and the Apennines.

(iii) Walachia, between the Balkans and the Transylvanian Alps.

2.—**The Continental Shelf and the European Seas.** The area of shallow sea is widest around the British Isles. Here the continental shelf, as limited by the one hundred fathom line, forms a rectangle, of which the south-western side is a line from the Bay of Biscay to a point off south-western Ireland; the north-western edge stretches from near Cape Clear in Ireland beyond the Shetland Islands, while the north-eastern edge is formed by the marked "deep" off the south of Norway.

The Baltic Sea, with its branches (the Gulf of Bothnia and the Gulf of Finland), and the passages from the North Sea to the Baltic (e.g. the Skager Rak and the Kattegat) are all included in the area of shallow sea.

The only other important shallow seas are: The White Sea in the north of Russia, the Sea of Azov, the northern part of the Black Sea, and the Caspian Sea. Note that the Caspian Sea is below the level of the Black Sea and of the open ocean. The Caspian Sea is gradually drying up, and the area of land to the north of it, which is below sea-level (the bright green on the physical map), represents the former bed of the sea which has been laid bare by evaporation.

SECTION II.—EUROPE

Chapter X

PHYSICAL AND CLIMATIC CONDITIONS

1.—**The "Build of Europe."** The continent may be divided from the point of view of physical features into the following sections :—

(*a*) *The European Plain.*—This is bounded on the north by a line from the White Sea, through Lake Wener in Sweden, to the mouth of the Severn in England ; on the south by a line from the mouth of the Severn, through the estuary of the Thames, along the northern edge of the Carpathians, and north of the Caucasus to the Caspian Sea ; on the east the boundary is the Ural Mountains. The only considerable elevation on this triangular plain is that of the Valdai Hills in Russia.

(*b*) *The Northern Highlands.* These are :—The Scandinavian Mountains, the Highlands and the Southern Uplands of Scotland, the Cumbrian Mountains and the Cambrian Mountains, and the mountains of Ireland. They are all formed of hard, old rock, and have been much dissected by denudation through geological ages.

(*c*) *The Southern and Central Mountains and Basins.*—The central knot of mountains is the Alps. From this great mass the following ranges should be traced :—

(i) The Apennines, forming the backbone of Italy, then continuing through Sicily, through the Atlas Mountains of northern Africa and the Sierra Nevada of south-eastern Spain.

(ii) The Pyrenees and the Cantabrian Mountains in the north of Spain.

(iii) The Illyrian Alps, on the eastern side of the Adriatic Sea, continued through Greece as the Pindus Mountains, and thence through the eastern Mediterranean via the islands of Crete and Cyprus, to the Taurus Mountains of Asia Minor.

(iv) From near the eastern end of the Alps the Carpathians curve round in a great arc, which is completed by the Transylvanian Alps (just north of the plain of Walachia on the physical

map of Europe). The Balkans continue the line on the south of the Danube. The Caucasus Mountains between the Black Sea and the Caspian Sea must also be considered a part of this great mountain line.

In addition to the above ranges of mountains there are certain elevated "blocks" of land which form plateaux. The chief of these are:—

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(iv) The plateau of Spain and Portugal, between the Cantabrian Mountains on the north and the Sierra Nevada on the south-east.

(v) The Rhodope Mountains of the Balkan peninsula, between the Balkans and the Pindus Mountains.

Three lowland basins, or plains, should also be noted in this region. They are:—

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The Baltic Sea, with its branches (the Gulf of Bothnia and the Gulf of Finland), and the passages from the North Sea to the Baltic (e.g. the Skager Rak and the Kattegat) are all included in the area of shallow sea.

The only other important shallow seas are: The White Sea in the north of Russia, the Sea of Azov, the northern part of the Black Sea, and the Caspian Sea. Note that the Caspian Sea is below the level of the Black Sea and of the open ocean. The Caspian Sea is gradually drying up, and the area of land to the north of it, which is below sea-level (the bright green on the physical map), represents the former bed of the sea which has been laid bare by evaporation.

Around the shores of the Mediterranean, and off the coasts of Norway, Portugal, and northern Spain, the sea-bed slopes down rather steeply to moderate depths.

3.—**The River System of Europe.** Only the most important features of the drainage of the Continent will be considered in this section. Detailed descriptions of all the important rivers will be found under the headings of the various countries. It is, however, essential at the outset to get a general view of the river system as a whole.

The most important *hydrographical centres* (i.e. centres from which the rivers diverge) are the Alps and the plateaus to the north of them, the Carpathians, and the West Russian "height of land" which terminates in the Valdai Hills.

(i) From the Alps and the neighbouring plateaus flow :—

The Rhine, flowing first northward through Lake Constance, then westward, then northward again on the eastern side of the Vosges, and entering the sea by the great delta of the Netherlands.

The Rhone rises near the Rhine, but flows westward through Lake Geneva, then southward to enter the Mediterranean Sea by the Gulf of Lyons.

The Danube rises in the Black Forest, to the east of the Vosges, flows eastward between the Alps and the Bohemian block, then southward across the plain of Hungary. At the Iron Gate it makes a passage between the Carpathians and the Balkans, then for a considerable distance it forms the boundary between Bulgaria and Rumania, and it enters the Black Sea by a delta.

The Po, which is the great river of northern Italy, rises in the Alps, flows eastward through the plain of Lombardy, and enters the Adriatic Sea by a delta.

The Elbe rises in the Bohemian block, and flows north-eastward through Germany to the North Sea at Hamburg.

(ii) From the Carpathians flow the rivers Oder and Vistula to the Baltic Sea, the Pripet, the Bug, the Dniester, and the Pruth to the Black Sea, and the Theiss across the plain of Hungary to join the Danube.

(iii) From the Valdai Hills flow the Western Dvina (also called the Düna) to the Gulf of Riga, the Dnieper to the Black Sea, the Don to the Sea of Azov, and the Volga, the longest river of Europe, to the Caspian Sea.

(iv) From the Urals flow the Petchora in the north, the Northern Dvina to the White Sea, the Kama tributary of the Volga, and the Ural River to the Caspian Sea.

4.—**The Great Cross Routes of Europe.** The best way of fixing on the mind the general features of the relief and river system of Europe, and at the same time realising the nature of

the control exercised by physical features upon routes, is to trace out on the physical map some of the great railway routes of the Continent. If this is done on the political map also, the student will thereby lay a useful foundation of knowledge of the inter-relation between the physical and the political geography of the region.

Note particularly the following routes:—

(i) From Paris, on the river Seine, through Belgium, along the northern edge of the highlands of the Rhine basin, to Berlin in the centre of the German portion of the great European plain; thence along the middle of this great plain, through Warsaw the capital of Poland, and Moscow the capital of Russia. Eastward the line is continued through Samara, and thence across Siberia as the Trans-Siberian Railway.

(ii) From Calais on the Straits of Dover, through Paris, then up the valley of the Seine, across the high land to the Rhone Valley, between the Cevennes and the Alps, to the terminal port of Marseille on the Lion Gulf (also called Gulf of Lyons).

(iii) From Paris eastward, across the Rhine, down the Danube valley to Vienna the capital of Austria, thence across the plain of Hungary to Belgrade the capital of Jugo-Slavia, and then by difficult routes across the Balkan peninsula to Constantinople and Salonica.

(iv) From Paris south-eastward, across the Alps to Milan in northern Italy, thence down the eastern side of the Apennines to Brindisi on the "heel" of Italy.

(v) From Hamburg, up the Elbe to Berlin, and Prague, the capital of Czecho-Slovakia, and thence to Vienna.

(vi) From Berlin southward, through Munich, then across the Alps to Venice and across the Apennines to Rome and Naples.

(vii) From Hamburg via Berlin, and round the eastern edge of the Giant Mountains and the Carpathians to Odessa on the Black Sea.

(viii) Routes from Moscow radiating to Archangel on the White Sea, Leningrad on the Gulf of Finland, and Sevastopol on the Crimea peninsula.

(Note in the above exercises how the great capitals are seen to be the centres of the great cross routes.)

THE CLIMATE OF EUROPE

1.—**The Winter Temperatures.** (See Fig. 32.)

(a) The January isotherms run roughly from north to south over the northern part of Europe, then turn eastward, running roughly parallel to the Mediterranean Sea in the south.

(*b*) The temperatures, therefore, decrease with distance fr
the sea, not with distance from the Equator.

The reason is that the land cools quickly in winter, and t
sea remains relatively warm.

(*c*) The coldest parts are in the north-east, where distan
from the sea and distance from the Equator both help to give col
winters. The whole of northern Russia, Finland, and norther
Sweden are frozen for nearly half the year, while the whole o
Russia, the greater part of Germany, and the countries of Centra
Europe (Czecho-Slovakia, Poland, Austria, Hungary, and the northern half of Rumania) are frozen, on the average of years, from one to five months.

(*d*) The great eastward extension of the isotherms to be observed between Iceland and Norway is due to the prevailing south-westerly winds, which bring relatively warm air from the Atlantic Ocean.

The very rapid decrease of temperature from west to east in Scandinavia should be noted as showing the effect of the "back-bone" of mountains in preventing oceanic winds, and consequently the mild climate, from extending to the interior.

(*e*) The Mediterranean Sea causes an extension of the mild winters far to the east, causing the eastern end of the Mediterranean to contrast strongly with the colder lands immediately northward.

(*f*) Comparison should be made between the Caspian Sea and the Norwegian Sea east of Iceland. The former, though more than 1500 miles further south, is frozen in winter, while the latter, almost on the Arctic Circle, is ice-free. The reason is, of course, that the Caspian is an inland sea, receiving only winds from the cold land, while the Norwegian Sea receives the warm westerly winds and the warm waters drifted from the Atlantic. (It is frequently stated in text-books that the Gulf Stream is mainly responsible for the mild winters of Britain and north-western Europe. This is an error. The Gulf Stream does *not* reach the British Isles, but some warm surface water is drifted from it north-westward towards our shores. Thus it is the *wind*, not the ocean current, which is chiefly responsible for our mild climate.)

2.—**The Summer Temperatures.** (See Fig. 33.)

(*a*) The isotherms run roughly from west to east, showing
hat in summer the temperature decreases most with distance
rom the Equator. (Compare, for example, the temperature of
he Baltic coast of Germany (64° F.) with that of the north coast
f Africa (80° F.).)

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(*b*) The mountainous regions of the Alps, the Illyrian Alps, the Carpathians, and the Caucasus.

(*c*) The whole of western Europe, central Europe, Sweden, and all Russia except the extreme north and the south-east, receive moderate heavy rainfall from the in-blowing westerly winds.

The areas of light rainfall are :—

(*a*) Northern Russia round the White Sea.

(*b*) South-eastern Russia round the Caspian Sea.

(*c*) The Mediterranean region—Spain, Corsica, Sardinia, Sicily, Greece, Asia Minor, and northern Africa. (Note that the peninsula of Italy receives some rain, partly on account of the Apennines, and partly because it has frequent winds from the north-west.)

6.—**The Chief Climatic Divisions of Europe.** Gathering together the above facts relating to summer and winter temperatures, and summer and winter rainfall, we may divide Europe into seven important climatic divisions, each of which has its own characteristics (see Figs. 36 and 37). The divisions are :—

(*a*) *Western Europe*, including the British Isles, Norway, Denmark, Holland, Belgium, northern and eastern France, and northern Spain and Portugal. The climatic characteristics of this region are: mild wet winters, fairly cool and rather wet summers, i.e an equable, moist climate.

(*b*) *Central Europe*, including the countries about the Danube, Germany, southern Sweden, Finland, north-eastern Russia, and the Baltic Republics of Lithuania, Latvia, and Esthonia. In this region the winters are cold, and the summers warm, giving a fairly extreme climate. The rainfall is rather low, the maximum amount coming in summer.

(*c*) *Northern Europe*, round the Arctic and White Sea coasts of Russia. Here the winters are long and cold, the summers short and cool, and the rainfall is always low. This is the *Tundra* region.

(*d*) *Central and Northern Russia*, with a very extreme climate, the winters being particularly long and severe. The rainfall is low, but most comes in summer, when it is of use for agriculture. In winter the moisture falls as snow

(*e*) *South-eastern Russia* —Here the climate is very extreme, the summers being particularly hot. In winter some snow falls and the rivers are frozen. The rainfall is low at all seasons. This is the *Steppe* region.

(*f*) *The Mediterranean Region*, which has warm rather wet winters, and hot dry summers.

(*g*) *The Mountainous Regions*, such as the Alps, do not fit into any of these natural regions, as the climate varies so much with the height of the land.

THE VEGETATION OF EUROPE. (See Fig. 37)

By the natural vegetation of any region we mean the kind of vegetation which would grow if man did not interfere with clearings, drainage, and cultivation. The natural vegetation depends, therefore, chiefly on the factors of climate and soil. The latter is, however, comparatively unimportant. Consequently we find that each of the climatic divisions mentioned above has its characteristic type of vegetation. These will be briefly described under paragraphs whose letters correspond to those of the climatic divisions.

(*a*) *Western Europe* in its natural state was covered with deciduous forests (e.g. beech, oak, ash, etc., which drop their leaves in winter), and heath, marsh, and grass-land. The ample rainfall and the mild climate are conditions which suit this type of vegetation.

(*b*) *Central Europe* consisted mainly of deciduous forest also, but the more extreme climate and the scantier rainfall encouraged the growth of coniferous trees on the one hand (cf. northern Russia) and open grass-land (cf. southern Russia) on the other.

(*c*) *Northern Europe, or the Tundra.*—Here the long winters prevent the growth of trees or luxuriant grass. The vegetation is represented by stunted shrubs, moss, and plants which flower rapidly in the short summer.

(*d*) *Central Russia* must be divided into two forest belts. In the north is a broad belt of coniferous trees (e.g. pine and fir), while in the centre of the country, where the summer rainfall is more abundant, is a belt of deciduous trees.

(*e*) *South-eastern Russia* is the Steppe region which shows a gradation of vegetation from the rich grass-land of the Black Earth region north of the Black Sea, through the poor grass-lands between the Caspian and the Black Seas, to the semi-desert and desert on the salty lands round the northern end of the Caspian Sea. Throughout the whole of this region the rainfall is insufficient for the growth of trees.

(*f*) *The Mediterranean Region* is characterised by evergreen trees, such as the olive, the chestnut, and the cork oak. The warm moist winter is the growing season. In summer the trees "rest"; they do not drop their leaves, but have various devices to protect themselves against the drought and heat. Some turn their leaves edgeways to the sun; others have leathery or hairy leaves; others have low-spreading branches and very deep roots.

(*g*) *The Mountains* show a gradation of vegetation from deciduous trees near their base, through coniferous trees and grassland, to a region of stunted bushes and mosses, like the Tundra vegetation.

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Chapter XI

NORTH-WESTERN EUROPE

FRANCE

The Physical Features

1.—**The Coast Line.** France has a great commercial asset in the fact that she has a long stretch of coast on three sides—facing the English Channel, the Atlantic Ocean, and the Mediterranean.

The Channel Coast approaches at Cape Gris Nez to within twenty miles of our Kentish coast. The coast between Calais and Dieppe is the counterpart of our own coasts in Sussex and Kent, being largely composed of chalk, which forms high cliffs. The only important indentations are the mouths of the rivers Somme and Seine. In the former case no important port has grown up, as the estuary is too shallow. In the latter case, Havre has become one of the most important ports of France.

Westward of the Seine estuary the peninsula of Cotentin stretches out towards England and terminates in Cape de la Hague.

The north coast of Brittany is much more indented than the rest of the Channel coast, but on account of the infertility of the peninsula no port of importance, except St. Malo and Brest, has grown up on the good harbours thus provided.

The Atlantic Coast shows considerable diversity of form. The west coast of Brittany shows many indentations due to the submergence of the land, which has allowed the sea to flow into what were formerly river valleys. In this respect this coast is comparable to the coasts of Cornwall, Pembroke, and south-western Ireland.

The middle section of this coast is broken by the long estuaries of the Loire and the Gironde. South of the Gironde the coast is low and straight, being formed by a line of sand-hills bordering the Landes.

The Mediterranean Coast may be divided into two sharply contrasted sections :—

(*a*) West of Marseille the coast is low and comparatively straight ; it is backed by low land and looks out on to the shallow Lion Gulf.

(*b*) East of Marseille the coast is much indented, forming deep, land-locked bays; it is backed by high land and looks out on to deep sea.

2.—**The Relief of the Land.** Five regions of high land should be distinguished on the physical map, viz.:—

(i) *The Auvergne Plateau* in the centre and south. This is a great block of high land, much cut up by river valleys, e.g. the Loire and the Allier. Above the general level of the plateau rise up the remnants of ancient volcanoes, long since extinct. Mount Doré in the centre rises to a height of 6190 feet. On the south-eastern side the broken edge of the plateau forms the ridge known as the Cevennes, overlooking the Rhone valley.

The Auvergne plateau is composed mainly of hard, old rock, somewhat similar to that of the Scottish Highlands. The soil is, therefore, thin and infertile. On the south-western side, however, are large areas of limestone, which rise up as dry, almost deserted plateaus, somewhat similar to the northern Pennine region.

An extension of the Auvergne plateau runs north-eastward forming the Côte-d'Or and the Langres plateau.

(ii) *The Pyrenees* form a most effective barrier between France and Spain, rising in Mount Maladetta to over 11,000 feet. On both western and eastern sides, however, they leave narrow coastal gaps which are traversed by the roads and railways connecting France with Spain.

(iii) *The Alps* occupy the whole of the eastern borderland of France between the river Rhone and the Mediterranean coast. They are composed of many ranges whose general direction is from north to south. It is unnecessary to burden the memory with the names of any of these ranges. The passes leading to Italy—the Col de Tenda, the Mont Cenis Pass, and the Little St. Bernard—should however be noted, although the actual passes are on the Italian side of the boundary.

Mont Blanc, on the boundary between France, Italy, and Switzerland, is the highest mountain of the Alps, attaining a height of 15,780 feet.

The Jura Mountains may be considered an extension of the Alps. They lie on the Franco-Swiss border north of the Rhone, and are characterised by numerous parallel ranges running from south-west to north-east.

(iv) *The Block-lands of the Franco-German Frontier.*—These are the Vosges, the Hunsrück, and the Ardennes. They are really great blocks of land which have been left upstanding when the land around them sank to a lower level.

(v) *Brittany* consists of parallel ridges and valleys which trend from north-west to south-east. Though these ridges are

not so high as to figure very prominently on the physical map, they have been important factors controlling the development of Brittany.

Between these five elevated regions three important areas of lowlands should be noted. They are:—

(i) *The Paris Basin.*—This is a structural basin, formed by a saucer-like downfold in the layer of chalk rock. It is therefore comparable to the London and the Hampshire basins. Like them, too, it is partly filled in with clay and sand. Round the edges the chalk, and farther out the limestone, layers rise up to form scarp-lands (e.g. the Argonne and the Wœvre) which are strictly comparable to the Chilterns and the Cotswolds in south-eastern England.

(ii) *Aquitaine* is the lowland basin between the Auvergne on the east, the Pyrenees on the south, the Biscay coast on the west, and on the north the extension of the hills of Brittany to the south of the Loire.

(iii) *The Rhone-Saône Basin* is bounded on the east by the Alps and the Jura, and on the west by the Cevennes, the Côte-d'Or and the Langres plateau. In the south it spreads out to form the lowlands of Languedoc to the west of the Rhone delta, and Provence on the eastern side.

3.—**The Rivers.** The main watershed of France runs along the Cevennes, the Côte-d'Or, and the Langres plateau. (The student should draw on the physical map this main "divide" between the rivers flowing to the Atlantic and those to the Mediterranean. In the same way, by drawing a line between those streams which eventually drain to the Channel and those which drain to the Bay of Biscay, he may divide the country into its main "drainage areas.")

(i) *The River Seine* rises in the Langres plateau, near Dijon, and flows north-westward to the sea below Rouen. Note that the tributary, the Yonne, is in a direct line with the lower Seine. If that were taken as the main stream, all the tributary streams—the Upper Seine, the Marne, and the Oise—would be seen to be on the right bank of the river. Thus the Seine is a "one-sided river."

The windings of the main stream below Paris and below Rouen are an indication of the level character of the plain in these regions.

(ii) *The River Loire* rises in the Cevennes, less than a hundred miles from the Mediterranean coast, flows northward in a deep valley cut in the Auvergne plateau, to Orleans, then turns westward through Tours, to enter the sea at Nantes. Its tributaries, the Allier, the Cher, and the Vienne, all rise in the Auvergne plateau and pursue nearly parallel courses to the north. Like

the Seine the Loire is a "one-sided" river, the only tributary of any importance on the right bank being the Sarthe from Normandy.

(iii) *The River Garonne* rises in the Pyrenees, but its chief tributaries, the Tarn and the Lot, flow through deep valleys from the Auvergne plateau. The Gironde is the combined estuary of the Garonne and the Dordogne.

(iv) *The River Rhone* rises in Mount St. Gothard in the centre of Switzerland, and flows westward through Lake Geneva. It enters France on leaving the lake below Geneva.

At Lyons it is joined by the Saône which, rising in the Langres plateau, pursues a remarkably straight course southward. An important tributary of the Saône is the Doubs, which is characterised in its course through the Juras by the way in which it doubles back on itself before escaping from the series of parallel ridges and valleys which constitute the Juras.

The rivers Isère and Durance, tributaries of the lower Rhone, are important because their valleys form route-ways across the Alps.

(v) *The River Meuse* rises in the Langres plateau not far from the sources of the Marne and the Saône. It flows northward between the Argonne and the Wœvre plateau, then across the north-western shoulder of the Ardennes into Belgium. An important tributary (not named on the physical map) runs along the northern edge of the Ardennes, from France through Charleroi to join the Meuse at Namur in Belgium. This tributary is the Sambre.

(vi) *The River Moselle* is a tributary of the Rhine, which rises in the Vosges, flows round the north-eastern end of the Langres plateau, then through Toul and Metz, and between the Hunsrück and the Eifel plateaus in Germany to join the Rhine at Coblenz.

4.—**The Natural Divisions of France.** On the basis of the physical features France may be divided into eight natural regions (see Fig. 38). These are :—

(i) The Central or Auvergne Plateau.
(ii) The North-Western Peninsula and the Loire Basin.
(iii) Aquitaine (roughly the Garonne Basin).
(iv) The Rhone-Saône Basin.
(v) The Alps and the Juras.
(vi) The Paris Basin.
(vii) The North-East.
(viii) The Franco-German Frontier region.

Each of the above will be described in detail, the climate, farming, minerals, industries, and towns being dealt with in separate paragraphs.

(i) THE AUVERGNE PLATEAU.

(*a*) *Climate.*—The height of the land makes the winters cold, though the summer temperature is fairly high. As has already been pointed out, this region has fairly heavy rainfall (over 60 inches per year), because the mountains make the air rise.

(*b*) *Farming.*—The soil of the plateau is infertile, and agriculture is difficult. The chief crops are rye and oats. Some cattle and sheep are kept.

In the deep valleys, however (e.g. those of the Allier and the Loire), more fertile soil is found, and the climate is warmer. Here wheat and oats are grown and dairy farming is carried on.

In the Causses, the limestone region of the south-west, neither agriculture nor pastoral farming is possible.

(*c*) *Minerals.*—Coal is found in several small fields, of which the chief are in the basin of the Allier, near Clermont-Ferrand; at St. Etienne, near the Loire; and near Le Creuzot.

Iron is also found in scattered regions, but not usually near the coal. Little is now mined, but the occurrences are of importance because they led to the development of iron manufactures in certain districts noted below.

(*d*) *Industries.*—Iron smelting and manufacture are carried on at Le Creuzot and St. Etienne. Clermont-Ferrand is noted for the manufacture of rubber tyres; Limoges for pottery.

(*e*) *Routes and Towns.*—An important railway from Paris via Orleans runs up the valley of the Allier, through Clermont-Ferrand, over the edge of the Cevennes, and down through Nimes to Marseille.

A cross route from Lyons to Bordeaux connects St. Etienne and Clermont-Ferrand.

Apart from these lines the region, being sparsely populated except in the valleys and the industrial centres, is badly served with railways.

(ii) THE NORTH-WESTERN PENINSULA.

(*a*) *The Climate* is moist and equable, on account of its exposure to the mild winds from the south-west.

(*b*) *Farming.*—The ridges of hard rock which cross the peninsula from south-east to north-west form infertile belts. In the centre of the region, and on the north and south coasts, however, there are more fertile belts. Here cattle are kept and wheat and oats cultivated. On the northern coastal belt an important industry is the intensive cultivation of early vegetables and flowers for the markets in London and Paris. Considerable quantities of butter and cheese are also exported.

(*c*) *Minerals* are non-existent or of little economic importance

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(*c*) *Minerals* are non-existent or of little economic importance.

(*d*) *Industries.*—Owing to the lack of minerals this region, with the exception of Nantes, which has large shipbuilding yards, has no important manufacturing centres. Fishing, however, takes the place of manufactures.

(*e*) *Routes and Towns.*—Railways radiate from Paris to Cherbourg, a naval station and port of call for ocean liners, and to Le Mans, on the river Sarthe, whence railways diverge through Rennes, the capital of Brittany, to Brest, a naval station on a fine landlocked harbour near the extreme west of the peninsula, and to Nantes, at the mouth of the Loire. The latter town has St. Nazaire as its outpost. A coastal route connects Brest with Lorient and Nantes.

St. Malo, a packet station on the north coast, exports butter and other dairy produce to England.

(iii) AQUITAINE.

(*a*) *Climate.*—This region is intermediate, both in rainfall and temperature, between the equable, moist climate of Brittany and the more extreme climate of the Rhone basin. Its temperature is rather high, averaging about 70° F. in July, and about 44° in winter. The rainfall is least in the middle of the basin (about 25 inches per year), increasing towards the coast and towards the highlands on its other borders.

(*b*) *Farming.*—Wheat and maize are cultivated on the fertile lands in the middle of the basin. Cattle are reared on the moister lowlands, and sheep on the hillsides and in the sandy district of the Landes. Vines are extensively cultivated.

(*c*) *Minerals* are again unimportant in this region.

(*d*) *Industries.*—The manufacture of wine is an important industry in the region round Bordeaux. Brandy is made at Cognac on the river Charente, which flows to the sea at Rochefort. Bordeaux has extensive sugar refineries.

(*e*) *Routes and Towns.*—The important route-ways in this region centre on Bordeaux. From that city the following railways should be traced on the physical map: North-eastward, through Angoulême, then to Tours through a broad gateway between the Auvergne plateau and the southward extension of the Brittany Heights. In this gap lies the famous battlefield of Poitiers.

South-eastward, through Toulouse, thence by a narrow gap between spurs of the Cevennes and the Pyrenees to Marseille. The Canal du Midi, connecting Marseille with the Garonne, also follows this gap.

Southward, along the Landes, to Bayonne, at the south-western angle of the Bay of Biscay, and thence round the western end of the Pyrenees into northern Spain.

Bordeaux is the important port of this region. It exports wine, and imports raw sugar. Its trade is chiefly with Africa and South America.

Rochefort is a naval station.

(iv) THE RHONE-SAÔNE BASIN.

(*a*) *Climate.*—There is a marked difference between the climates of the two ends of this basin. In the north the winters are very cold, the summers warm, and the chief rainfall comes in summer. In the south the climate is more equable, and the rainfall chiefly in winter.

(*b*) *Farming.*—Corresponding to these differences in climate is a marked contrast between the types of farming in the two parts of the basin.

In the north, around Dijon, the chief food crop is wheat, and the valley slopes of the Côte-d'Or and the Cevennes overlooking the Saône are terraced for the cultivation of the vine.

In the southern part of the region, from Marseille to Lyons, where the summers are dry and very hot, the chief crops are the typical Mediterranean assemblage—olives, oranges, and mulberries. On the leaves of the latter silkworms are fed. Wheat and vines are cultivated in this region also, but are not so important as in the northern half. Cattle are reared on the marshy lands round the delta of the Rhone.

(*c*) *Minerals.*—The coalfields of Le Creuzot and St. Etienne, which occur on the eastern edge of the Auvergne plateau, may be included in this region.

Some iron ore is found in the plateau of Morvan, between the Côte-d'Or and the Cevennes.

Bauxite, the ore from which aluminium is obtained, is mined near Nîmes, in the south.

(*d*) *Industries.*—The chief industrial towns in this region are:—

Le Creuzot, which manufactures artillery and general steel products.

St. Etienne, where large engineering works are situated.

Lyons, which manufactures silk, deriving the power from the near-by coalfield of St. Etienne, and the raw material partly from local supplies and partly by imports from China and Japan. Silk manufacture is also carried on at Nîmes and Avignon.

(*e*) *Fishing.*—This is chiefly confined to the western half of the coast of the Gulf of Lyons, which fronts on the shallow portion of sea noted above. Cette is the most important fishing port.

(*f*) *Routes and Towns.*

(1) The Rhone-Saône valley forms part of the great north to

south route across France from Paris to Marseille. This route enters the Saône valley by a gap between the Langres plateau and the Côte-d'Or, about Dijon; it then proceeds southward through Chalon to Lyons, Avignon, and Marseille.

(2) *Lyons*, at the confluence of the Rhone and the Saône, is the centre of the routes of the valley. From it the following routes should be traced on the map :—

- Northward to Dijon and Paris.
- Northward through Besançon and Belfort, through the gap between the Vosges and the Jura, to the Rhine.
- Eastward up the Rhone valley, thence across the Alps by the Mont Cenis Tunnel to Italy.
- The continuation of the preceding route up the Rhone to Geneva and Switzerland.
- Westward across the Auvergne plateau to Limoges.
- Westward to St. Etienne and Clermont-Ferrand.

(3) *Marseille*.—This is the most important port of France. Its trade is chiefly concerned with the Mediterranean region, north and west Africa, India, Indo-China, and the East Indies. It imports great quantities of oils, such as coconut oil and palm oil. These form the basis of its manufactures of soap and candles. Other important articles imported are silk, from China and Japan, wine (for mixing with local wines), hides, and skins.

Note that the port is built some distance to the east of the delta, away from the unhealthy, swampy ground.

Marseille is not only a great port: it is also the great route-centre of southern France. From it the following routes should be traced :—

- Northward to Lyons, Dijon, and Paris.
- North-westward through Nîmes, and across the Auvergne plateau by the Allier valley, and thence to Paris.
- Westward through Montpellier, and thence through the gap between the Cevennes and the Pyrenees to Bordeaux.
- Branching off from the above route at Narbonne is the route round the eastern end of the Pyrenees, via Perpignan, to Spain.

(4) *Cette* is noteworthy as a fishing port and as the terminus of the Canal du Midi, which connects the Garonne with the Gulf of Lyons.

(5) *Toulon* is the great naval station of southern France. It is situated on a deep harbour and is easily defended from the rocky heights around it. The position of Marseille and Toulon may thus be compared to those of Southampton and Portsmouth in the Hampshire basin.

(v) The Alps and the Juras.

These mountainous regions are relatively unimportant as factors in the economic geography of France. The soil is generally thin and infertile, and the chief occupation is stock-raising—sheep and goats in the south, and cattle on the slopes of the Jura. *In the valleys of the Durance, Isère, Rhone, and Doubs,* however, vines are grown and some wheat cultivated.

Minerals occur in scattered localities, e.g. graphite in the upper reaches of the Durance. Coal and iron are also found, but in small quantities, in rather inaccessible regions.

Grenoble, in the basin of the Isère, is the chief town on the Alpine portion. Here gloves are manufactured, the industry being based on power derived from neighbouring waterfalls, and on the local supplies of "kid" from the goats.

The Riviera district on the south coast may be considered as a sub-section of this region. Here a narrow coastal strip is protected from northerly winds by the high ranges of the Alps, while its southerly aspect gives it abundant sunshine. Along the coast, amid the beautiful scenery of sea and mountains, has grown up a line of international winter resorts—Cannes, Nice, and Monaco—this last being famous for the casino at Monte Carlo.

(vi) The Paris Basin.

This region forms the centre around which France as a country has been welded together, and it is in many respects *comparable to the London basin.*

(*a*) *Climate.*—This region forms a transition between the equable oceanic climate of the western peninsula and the extreme continental climate of the interior of Europe and Asia. In January its average temperature is about 37° F. (colder, that is, than London, although it is further south), while in July the average temperature is about 65° F. (that is, a little warmer than London). The rainfall is rather light, as it is sheltered from the westerly winds. More rain falls in the summer half of the year than in winter. This rainfall distribution is characteristic of a continental interior rather than of a west-coast region in temperate latitudes.

(*b*) *Farming.*—The clay and sand which partly fill the chalk basin form, in most parts, a very fertile soil. The rather dry climate and the warm sunny summers, combined with the fertility of the soil, make this region the chief wheat-growing area of France.

Market-gardening is a profitable industry, on account of the large demand of the Parisian market.

Cattle-rearing and dairy-farming are carried on in the valley

bottoms, and in the clay vales of the scarp-lands to the north-east.

Vines are cultivated on terraced slopes in the scarp-lands of the Champagne district, particularly round Rheims.

Sugar-beet is widely cultivated in the north-eastern part of the basin.

(c) *Minerals.*—Few minerals of economic importance occur within the basin itself. Mention may be made, however, of the glass sands of Fontainebleau near the confluence of the Seine and the Yonne. Much of this sand is exported to Britain for use in the glass factories of Yorkshire, Lancashire, etc.

(d) *Towns, Routes, and Industries.* Paris is the hub of the region. It first grew up where an island in the river Seine formed a convenient crossing-place. To this point routes from the surrounding regions naturally converged, so that Paris is the route-centre of France just as London is of England. The following routes should be traced on the physical map by the student, who should notice not only how they centre on Paris and link up the surrounding districts with the capital, but also how their course has been controlled by various physical features :—

(1) From Calais, through Amiens to Paris.
(2) From Le Havre through Rouen.
(3) From Cherbourg and Caen.
(4) From Brest, through Rennes.
(5) From Nantes, through Tours and Orleans.
(6) From Spain, via Bordeaux, Tours, and Orleans.
(7) From Marseille, via both Orleans and Dijon.
(8) From Strasbourg on the Rhine, via Nancy and Châlons, and down the Marne.
(9) From Strasbourg through Metz, Verdun, and Rheims.
(10) From Liège in Belgium, down the valley of the Oise, through St. Quentin and Compiègne.
(11) From Brussels, through Lille, Arras, and St. Quentin.

Not only is Paris the centre of the routes of France, and of French life, government, and fashion, but it is also an important manufacturing city, specialising in the production of clothing, furniture, and jewellery.

Rouen is an important port, representing the head of ocean navigation on the Seine. (Though small ships can get up to Paris they do not carry much cargo.) The city imports cotton and wool, mainly from America, while coal is conveyed from the coal-mining district around Lille, or imported from England, via the Seine. It has, therefore, become an important centre for the manufacture of various textiles, particularly cotton.

Le Havre is the third port of France, coming next in import-

ance after Marseille and Rouen. It is the port of departure for transatlantic liners, and imports coal, cotton, and wool.

Rheims has cotton and woollen nanufactures.

Dieppe is a packet station, having steamer connection with Newhaven and Southampton.

(vii) THE NORTH-EAST.

This region, between the north coast, the river Somme, and the Franco-Belgian boundary, is the chief industrial region of France.

(*a*) *Climate.*—This does not differ in any marked degree from that of the Paris basin, except that the rainfall is more equally distributed throughout the year.

(*b*) *Farming.*—The cultivation of sugar-beet is the most characteristic type of agriculture in this region, though wheat, barley, and oats are also grown. Dairy-farming is fostered by the demands of the great industrial population of the towns around Lille. The region does not cultivate vines, the northern limit of the vine occurring between the rivers Somme and Oise.

Flax is also cultivated.

(*c*) *Minerals.*—The most important coalfield of France occurs here in the district around Lille. This coalfield is really an extension of the Meuse valley coalfield of Belgium. The most important coal-mining centre is Lens. No other minerals are mined in this region.

(*d*) *Industries and Towns.*—Lille is the industrial centre of this region. It manufactures linen, cotton, and woollen goods, and has great engineering works and sugar refineries, these last utilising the local grown beet.

Roubaix, Tourcoing, Amiens, and St. Quentin are important centres for woollen manufacture, while Valenciennes *manufactures lace.*

Dunkirk is the port for this region, importing cotton and wool, and exporting a large part of the manufactured products.

Calais is the packet station opposite Dover. The great railway routes of this region connect either the coastal towns with Paris, or Paris with Brussels and other Belgian towns. Lille is at the crossing of important routes from Boulogne, Antwerp, Brussels, and Paris.

(viii) THE FRANCO-GERMAN FRONTIER REGION.

This is the much contested area of Alsace and Lorraine.

(*a*) Its climate is, on account of its distance from the sea,

rather extreme, but rainfall is fairly evenly distributed through the year.

(b) *Farming.*—Vines are cultivated on the terraced slopes; wheat, barley, and oats are grown on the fertile valley floors. In the sheltered Rhine plain, at the foot of the Vosges, tobacco and hops are cultivated in addition to the previously mentioned crops.

(c) *Minerals.*—This region is the richest and most extensive iron-mining district in France. The Lorraine ironfield, around the towns of Longwy, Briey, Nancy, and Metz, though formerly divided between France and Germany, is now entirely in French territory. It forms one of the most valuable of the economic acquisitions of France which resulted from the Great War.

Coal is found in the basin of the river Saar, a tributary of the Moselle. The chief coal-mining region is centred on the town of Saarbrücken. Although the Saar territory is not included in France, she has control over the coal mines until 1934, at the earliest.

Salt is mined on the western slopes of the Vosges, south of Epinal.

Potash, useful as an artificial manure, and as a basis of many chemicals, is found in the Rhine valley near Mulhausen.

(d) *Industries, Routes, and Towns.*—Iron is smelted in the towns on the Lorraine ironfield—Longwy, Briey, etc.

Cotton goods are manufactured in many towns at the foot of the Vosges, e.g. Mulhausen in the Rhine valley, Epinal, Colmar, and St. Dié on the western slopes of the Vosges. It is worthy of note that many of the cotton factories in these towns are run by electricity derived from the water-power of the rapid streams of the Vosges.

The most important towns in this region owe their development very largely to their control of the routes through the "Lorraine Gate" between the Vosges on the south and the Hunsrück on the north. Thus, Verdun is a great fortress-town holding the passage of the route from Strasbourg to Paris, across the Meuse. Metz, Toul, and Nancy hold similar positions, the first two on the Moselle, the last on its tributary the Meurthe.

Strasbourg, situated where the route through the Lorraine Gate reaches the Rhine, and at the confluence of the Rhine with its tributary, the Ill (a little stream flowing parallel to the Rhine at the eastern foot of the Vosges), is a town of great historical importance. It is also the head of ordinary barge navigation on the Rhine, and is consequently an important river port. From it the Rhine-Marne Canal runs through Toul and Chalons to Epernay on the Marne.

BELGIUM. (See Fig. 40)

Natural Divisions.—From both physical and economic points of view Belgium may be divided into four distinct regions. They are, from south to north:—

The Southern Highlands.
The Meuse Valley.
The Belgian Plain.
The Coastal Belt.

These will be described in turn.

1.—**The Southern Highlands.** This is the plateau of the Ardennes, a bleak highland region over 1200 feet in height in the south, but falling to 600 feet to the north and east. The area is well wooded, but cultivation is mainly restricted to the more fertile valleys. The uplands are largely devoted to sheep rearing, and the whole region is comparatively sparsely populated.

The river Meuse crosses the western angle of the plateau, forming an important line of communication. In this valley lie the only important towns of the region—Givet and Dinant, the latter noted for the picturesque limestone cliffs which rise up from the Meuse to the level of the plateau.

The river Ourthe crosses the eastern end of the plateau, and forms a subsidiary cross route. On a tributary of the Ourthe is the town of Spa, noted for its mineral springs.

2.—**The Meuse Valley Region.** This is the belt of country lying between the Ardennes on the south and the Belgian Plain on the north. It is drained by the river Sambre, which rises in France, and flows north-eastward to join the Meuse at Namur. The combined stream then continues north-eastward to Liège, where it receives the tributary river Ourthe on the right bank, and then turns northward to enter Holland under the name of the river Maas.

As a line of communication between France and Belgium the combined Sambre-Meuse valley is of paramount importance. During the Great War, for example, it formed the main line of advance of the German armies.

Its chief importance is, however, due to the presence of coal.

The Meuse Valley coalfield extends along the whole length of the trough from the German border to Mons, and thence into France. It may, however, be divided into three distinct producing regions. These are:—

(*a*) The western region, on the French border, around the town of Mons. This part of the coalfield is continuous with the French coalfield around Lille.

(*b*) The valley of the Sambre, the chief mining town in this region being Charleroi.

(c) The eastern region, in which the chief towns are Liège and Namur. This coalfield extends across the German border to Aix-la-Chapelle.

Industries.—The industries of the Sambre-Meuse valley are chiefly connected with metal-working. Iron was formerly found in workable quantities in the northern edge of the Ardennes, and

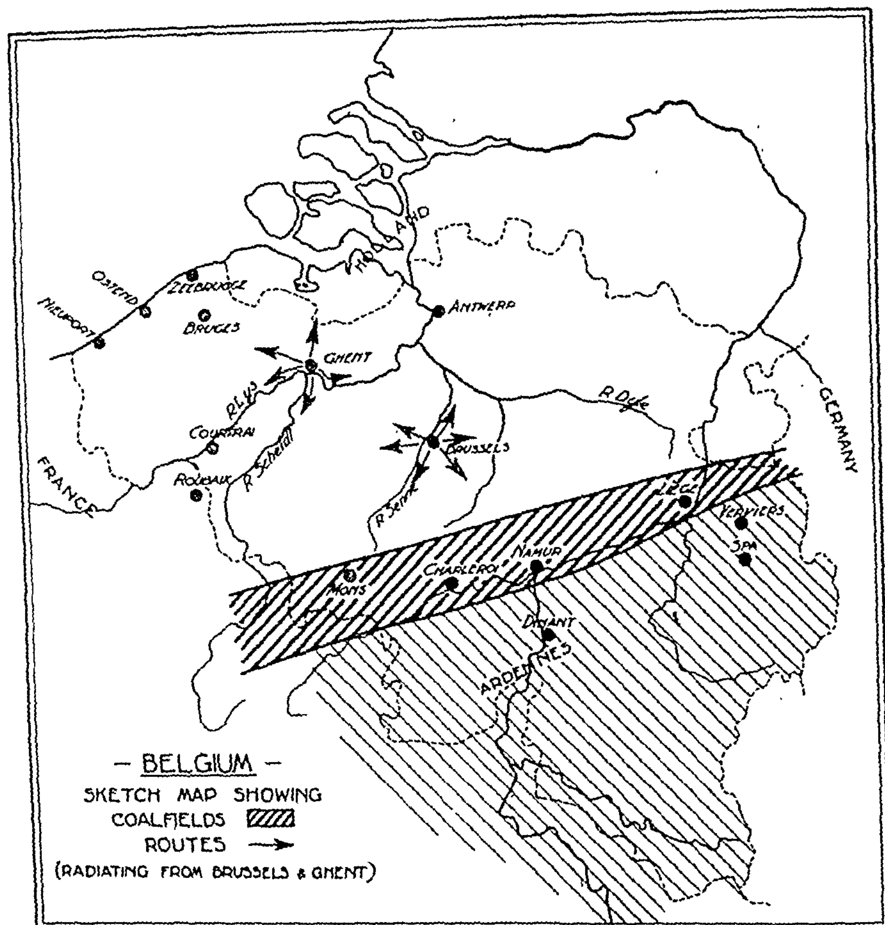


Fig. 40

Namur was the first town in Europe to develop its ironworks on a large scale. Iron is now imported, mainly from the little duchy of Luxemburg to the south. Liège, Charleroi, and Namur all smelt iron and manufacture steel, Liège specialising in fire-arms, Namur in guns and cutlery, Charleroi in smelting.

Glass is also manufactured at Charleroi, the sand being obtained from the north-eastern part of the Belgian plain.

Woollen goods are manufactured at Verviers, near Liège.

The industry undoubtedly sprang up because of the supplies of raw wool from the neighbouring plateau. Zinc is mined near Verviers.

Town Sites.—Namur and Liège are strikingly similar in the factors which have led to their development and importance. These factors may be summarised as follows:—

(*a*) They are both confluence towns, Namur being at the confluence of the Sambre and the Meuse, Liège at the confluence of the Meuse and the Ourthe.

(*b*) They are both situated at the meeting points of the west-to-east route of the Sambre-Meuse valley with a south-to-north route from the plateau to the plain.

(*c*) Consequently both became market towns, and

(*d*) Fortress towns.

(*e*) Situated on a coalfield, near supplies of iron, lead, and zinc, both have become important metallurgical centres.

3.—**The Belgian Plain.** Physically this region is part of the great European plain which extends from Russia to the northern angle of France.

Rivers.—The Belgian plain is drained by the river Scheldt and its tributaries, of which the chief are the Lys, the Senne, and the Dyle. All these rivers are navigable almost to their sources, and form, along with the canals dependent on them, valuable lines of communication.

Farming.—The natural fertility of the soil in the Belgian plain varies greatly, some parts being clayey and consequently "wet"; other parts being sandy and infertile, but by careful cultivation, largely carried on on small holdings by spade-culture, the soils have been mixed and rendered very productive. In fact, Belgium, though it ranks as an industrial country, is also an important agricultural country The chief crops are wheat, oats, barley, beet, flax, potatoes, and root crops.

Cattle are kept, being fed on root crops to a much greater extent than in England, while the waste from the sugar-beet factories is also used as cattle-feed.

Horses are reared on the Flanders plain, to the west of Brussels.

Flax is grown chiefly in the valley of the Lys.

The Campine, a sandy district in the north-east of Belgium, is infertile, and is one of the least densely populated parts of the country. Coal has, however, been discovered here, and the region may in the near future become an important mining and manufacturing area.

Industries.—Textiles form the chief manufactures of the plain. Tournai and Courtrai, near the French boundary, are famous

for the manufacture of linen. The flax is "retted" in the waters of the Lys, which seem to be particularly suitable for this process. Cotton is manufactured at Ghent; lace at Brussels and Mechlin. Carpets are manufactured at Brussels.

Routes and Town Sites.—The centre of Belgian routes is the capital, Brussels, which is situated in the middle of the plain on the Senne tributary of the Scheldt. From it the student should trace the routes radiating to all points of the compass, as follows:—

(*a*) To Mons, Valenciennes, Amiens, and thence to Paris.
(*b*) To Liège, Verviers, and thence to Aix-la-Chapelle and Cologne.
(*c*) To Courtrai and Calais.
(*d*) To Ghent, Bruges, and Ostend.
(*e*) To Antwerp.

Other important lines of communication are by the rivers and canals. Ghent is connected to the coast by two canals, the one through Bruges to Ostend, with a branch to Zeebrugge (equals Sea-Bruges), and the other northward to the estuary of the Scheldt. (Note that this coast, much of which is below sea-level, is included in Holland.) The Scheldt is navigable for boats both above and below Ghent. The Campine Canal connects Antwerp with the Scheldt at Maastricht and Venlo, both in Holland.

Ghent is, therefore, the natural focus of Belgian trade.

Bruges was formerly an important port, but owing to the silting up of its harbour (note how far it is from the sea) it has lost most of its importance.

4.—**The Coast Lands.** The coast of Belgium is fringed with sand dunes. These, together with the shallowness of the sea, considerably impede navigation. There are only three entries into the land on the stretch of coast facing the open sea. They are at Nieuport, Ostend, and Zeebrugge. Nieuport is little more than a fishing port. Ostend is a packet station with passenger services to Dover and Harwich. Zeebrugge is a modern port, developed at great cost as the modern equivalent of the old port of Bruges, which is now far inland. Considerable difficulty is, however, experienced in maintaining sufficient depth of water for large steamers.

Antwerp is, therefore, the only really first-class port. Situated at the mouth of the navigable Scheldt, with connections by railway and canal to the industrial districts of Germany and central Europe, it is in a very favourable position for receiving imports for a large and populous area. It is, moreover, nearer to the English Channel than its rivals, Rotterdam and Amsterdam in Holland, and Hamburg in Germany. One obvious disadvantage is the fact that the actual mouth of the Scheldt is in Dutch waters.

The chief imports are meat, wheat, cotton, wool, and timber, considerable quantities of all these commodities being imported for re-export to Holland and Germany. Its exports consist chiefly of coal, iron and steel goods, machinery, and sugar. Again, many of these commodities have their origin in Germany.

HOLLAND

1.—**Surface.** The greater part of Holland is formed by the combined delta of the Rhine and the Maas (the latter being the Dutch name for the Meuse). This delta was formed by the mud brought down by the rivers and deposited in what was formerly a large shallow bay.

The greater part of western Holland is below sea-level. It has been reclaimed by building dykes and pumping out the water. Such reclaimed lands are known as *polders*. Formerly the pumping was all carried out by means of windmills, and though these are still a characteristic feature of the Dutch landscape, they are to a large extent being replaced by petrol-driven pumps.

The coast-line is, however, chiefly above sea-level, being formed of a line of sand dunes which form a natural dyke. The Frisian Islands represent the former coast-line of northern Holland. The land between these islands and the coast has sunk, allowing the sea to flow in and form the Zuider Zee, and the smaller Dollart Zee farther north, on the boundary between Holland and Germany.

A large part of the Zuider Zee is now being reclaimed.

In the eastern half of the country the land is higher, rising to about 300 feet in the north-east, and in the south-east to 1000 feet at the edge of the Ardennes. In the north and east the land is sandy and rather infertile, while considerable areas of swamp occur near the Dollart Zee.

2.—**Rivers.** The Rhine, soon after entering Holland, splits up into two distributaries, the Waal and the Lek. Other distributaries flow to the Zuider Zee and to the North Sea, near Leiden, but these are of very little importance. Of the two main distributaries the Lek, on which stands Rotterdam, is the more important.

The Maas pursues a course which is parallel to that of the Waal, and near their mouths the two streams are united by several cross-channels. The only other river of importance is the Vecht, flowing from Germany into the Zuider Zee.

3.—**Climate.** Holland has a rather more extreme climate than Britain, having colder winters (the canals are frequently *frozen for long periods*) and warmer summers. The rainfall is

about like that of the English Midland plain, amounting to about 30 inches, and fairly evenly distributed throughout the year.

4.—**Farming.** Holland is pre-eminently a farming country. Cereals, such as wheat, oats, and barley, are cultivated in the lower western part, although wheat is not a very important crop on account of the cloudiness of the summers. On the drier, sandy lands of the east, rye is very extensively grown. Beet is an important crop throughout the eastern area.

Cattle-rearing and dairy-farming are the natural occupations in the damp polders. The humidity of the air and the abundance of water in the soil favour the growth of rich pastures. Cattle are also fed to a great extent on root crops grown for that purpose. Butter and cheese are among the most important exports of Holland.

Bulb culture is of great importance in Holland, probably owing its origin to the fact that in the Middle Ages the cultivation of bulbs was a great hobby of the well-to-do classes.

Other crops cultivated are potatoes, flax, and tobacco. In the drier eastern part of the country cattle are unimportant, their place being taken by sheep.

5.—**Minerals.** Coal is mined in Limburg, the province about Maastricht in the extreme south, which is thrust like a wedge between Belgium and Germany. The only other product which may be classified in this section is clay, which is used at Delft for the making of pottery.

6.—**Ports and Trade.** Rotterdam is the chief port of Holland. Situated on the navigable Lek, it forms the best entrance to the Rhine valley. It has, therefore, a large transit trade, i.e. it imports goods which are later distributed to other countries, e.g. Germany. The chief imports are wheat and flour, iron and iron ore, cotton and wool and timber. Other products, which come largely from the Dutch colonies in the East Indies, are cocoa, coffee, cane sugar, and tobacco.

The exports from Rotterdam fall into two classes :—

(*a*) The re-export of imported foodstuffs and raw materials to other countries, such as Germany.

(*b*) The export of manufactured products, such as iron goods and textiles from Germany, and of her own dairy produce, sugar, cocoa, etc.

Amsterdam, the second port of Holland, is situated on the south-western end of the Zuider Zee. This sea is not deep enough for modern steamers, but Amsterdam is connected with the sea by two canals :—

(*a*) The North Sea Canal to Ijmuiden ; and
(*b*) The North Holland Canal to Helder.

The port is also well connected with the rest of Holland and with Germany by an excellent system of railways and canals. It has, therefore, in spite of the disadvantages of its position, become one of the most important ports in Europe.

Packet stations are Flushing, on the island of Walcheren, and Hook of Holland, near the mouth of the Maas.

7.—**Industries and Towns.** The industries of Holland are such as arise out of either her agriculture or her imports. In the former class the preparation of beet-sugar, butter, cheese, and condensed milk, and the distillation of spirits must be mentioned. In the latter class diamond-cutting at Antwerp, and the preparation of cocoa, quinine, tobacco, and cane sugar are among the most important.

Schiedam, near Rotterdam, is a noted centre for the brewing of beer and the distillation of spirits.

Delft manufactures pottery. Haarlem, just behind the dunes of the North Sea coast, is the centre of the bulb industry. Utrecht, built on the boundary between the polders and the higher land, controls the dyke system of Holland; it also manufactures cigars. Some textiles (e g. " holland "—a coarse linen fabric) are manufactured at Tilburg, near the Belgian border.

DENMARK

Denmark consists of the peninsula of Jutland, with the island to the north of the Liim Fiord and the Baltic islands, the chief of which are Fyen, Laaland, Zealand, and Bornholm.

1.—**The Coast.** The west coast is formed by a line of sand dunes looking out on a shallow sea full of sandbanks The northern part of this coast is a long sand-spit ending in the low-lying peninsula of the Scaw. The Liim Fiord, which was formed about a century ago by the sea breaching the western line of sand dunes and flowing inland, divides the peninsula in two. The strait is not a real fiord (see section on Norway), but is shallow and unfit for navigation. The only good harbour on the west coast is that of Esbjerg.

The east coast is more diversified than the west, having numerous indentations called Fohrden, some of which make good harbours.

The passages between Jutland and Sweden leading into the Baltic should be carefully noted on the map.

The Sound between Sweden and the island of Zealand is the most easily navigable entrance to the Baltic. It is narrowest at the northern end between the Danish town of Helsingōr and the

Swedish town of Helsingborg; here the channel is only three miles wide.

The Great Belt, between Zealand and Fyen, is wider than the Sound, but is less navigable on account of numerous sandbanks and dangerous currents. The Little Belt, between Fyen and Jutland, suffers from the same disadvantages as the Great Belt, and is also the narrowest of the three Baltic entrances.

The Skager Rak is the strait, eighty miles broad, between Jutland and Norway, while the Kattegat lies between Jutland and Sweden.

2.—**The Surface.** Denmark nowhere rises to a height of 600 feet above sea level. On the other hand, none of its surface is below sea level, consequently the general height of the land is greater than that of Holland. Although the land is so low, it is by no means level. Near the west coast the dunes of the seaboard are continued inland by a line of sandy heath-covered hills. Near the eastern coast a belt of chalk crops out and gives some diversity to the surface (indicated on the coloured map by brown shading).

The islands are all low, almost level land, with the exception of Bornholm, which is composed of hard rocks resembling granite. These rocks give the island a high, cliffed coast-line which contrasts very strongly with that of the rest of Denmark.

The narrowness of the country and the lack of high land accounts for the absence of any rivers of importance.

3.—**The Soil.** In the west of the country the soil is sandy and infertile. To the east of the sand dunes are considerable areas of bog-land. The eastern side of the peninsula is composed of fertile sand and clays, mixed with debris deposited by glaciers during the great Ice Age. The most fertile soil is, however, found on the islands of Fyen, Zealand, and Laaland.

4.—**The Climate.** Being situated between the latitudes of Aberdeen and Newcastle, and being almost surrounded by the sea, Denmark has a rather cool, temperate climate. It is, however, open to the cold easterly winds which in winter sweep over the country from Russia and the frozen Baltic. Its winter temperature is, therefore, lower than that of England, averaging only about 33° F. in January. In summer its temperature is similar to that of England, the July average being about 60° F. It has, therefore, a rather more extreme climate than that of England.

The rainfall is slightly higher than that of eastern England, being about 30 inches per year. Like the greater part of the Continent, it receives more rain in summer than in winter.

5.—**Minerals.** Denmark has neither coal nor iron. Her

only mineral product is china clay from the granite of the island of *Bornholm*.

6.—**Farming.** Owing to the lack of minerals Denmark is perforce a farming country. Her climate is, however, not warm enough and sunny enough to be very suitable for wheat-growing, hence the chief cereals cultivated are *oats, barley, and rye*, in order of importance. Sugar-beet is very widely grown, while potatoes are also cultivated. A special feature of Danish agriculture is the cultivation of root crops and specially sown grasses like clover, to provide winter feed for the cattle.

Dairy-farming is the principal occupation of Denmark. The farms are small and are cultivated by their tenant-proprietors on the most scientific lines. The resulting yield of butter, bacon, eggs, and cheese is enormous, these products forming the chief exports of the country.

There are very few factories in Denmark, with the exception of the numerous butter and cheese factories, and the bacon-curing establishments. Some few factories are engaged in the production of beet-sugar and agricultural implements.

7.—**Fishing.** This is relatively unimportant, the chief energies of the people being devoted to the cultivation of the land. The Liim Fiord is, however, famous as a breeding-ground for plaice. The fish, though numerous, are small, and the total value of the catch is not very great.

8.—**Towns.** Copenhagen, the capital, has a population of over 500,000. It is on the only deep harbour in Denmark, and is in a favourable position, controlling the chief entrance to the Baltic. It is connected by train-ferry to Malmo in southern Sweden, and is a great distributing centre for the surrounding regions. It exports a great part of the dairy produce of Denmark It has some shipbuilding yards, sugar refineries, and flour mills.

No other town in Denmark has more than about 60,000 inhabitants, nearly all those appearing on the map being small towns with between twenty and thirty thousand inhabitants. Nevertheless, in a land of villages they are relatively important.

Aarhus, on the east coast, is a port engaged in the export of dairy produce.

Odense is situated in the centre of the fertile island of Fyen.

Esbjerg, on the only good harbour of the west coast, is a packet station, and the terminus of the railway across the peninsula. It has considerable exports of dairy produce, and is a fishing centre.

9.—**Railways.** Two lines of railway should be noted on the map, viz.:—

(*a*) From Hamburg in Germany, northward through Fredericia and Aarhus to Aalborg on the Liim Fiord.

(*b*) From Malmo in Sweden, by train-ferry across the Sound to Copenhagen, thence across Zealand to Korson and by train-ferry across the Great Belt to Nyborg on the island of Fyen. The Little Belt is also crossed by train-ferry to Fredericia on the mainland, whence the line continues to the port of Esbjerg on the west coast. Thus Denmark has a continuous route from Malmo to Esbjerg; by its construction she has done much to attract Baltic trade which would otherwise have been diverted through the Kiel Canal.

ICELAND

Politically this island is a part of Denmark, being a remnant of her former empire. The island is situated just south of the Arctic circle, and therefore has a cold climate. Being in the path of the westerly winds, however, its climate is milder than that of most regions in the same latitude, and the southern coasts are not usually closed by ice.

The chief occupations of the people are sheep-rearing, dairy-farming, and fishing. Some agriculture is carried on in the more fertile regions on the south, oats, barley, and potatoes being cultivated. In the centre and north, however, are large ice-fields. Hecla is a well-known volcano. The chief town is Reykiavik on the south-west coast. It is a fishing centre, but is little more than a village.

THE FAROES

The Faroes, or Faroe Islands, are also part of the kingdom of Denmark. They rise up from a submarine ridge which extends from the north of Scotland through the Orkneys and the Shetlands to Iceland. The name Faroes means "sheep islands," and the chief occupation of the inhabitants is sheep-rearing. Some fishing is also carried on.

SCANDINAVIA

Scandinavia comprises the two countries of Norway and Sweden. Although these two political divisions show considerable differences, it will be most convenient to study the general features of the peninsula as a whole.

1.—**Surface.** The peninsula of Scandinavia may be described as a great plateau, sloping down steeply to the sea on the north-western or Norwegian side, and more gently to the Baltic or Swedish coast. This plateau has been cut up into deep valleys and high mountains by numerous rivers. These rise in the high

watershed which lies near the western coast, and forms the boundary between northern Norway and Sweden.

The plateau has an average height of about 4000 feet, but portions of it reach up to six or eight thousand feet. The highest and broadest part of the highland region is in southern Norway. There the Dovre Field attains in Snehätta a height of 7820 feet, the Jötun Field in Galdhapig rises to 8400 feet, while the Hardanger Field farther south forms a broad plateau which does not culminate in any notable peak.

The southern part of Sweden is a lowland area which must be considered separately.

The surface of the highland region is studded with great ice- and snow-fields, while many of the valleys are filled with glaciers. These glaciers, however, melt before reaching sea level.

2.—**The Rivers.** In Norway the rivers, flowing as they do from the high watershed near the sea, are numerous, but short and rapid. The only river of note is the Glommen, which forms a deep trench leading across the mountains to Christiania (=Oslo).

On the Swedish side, however, the rivers are much longer. The rivers Tornea, Lulea, and Dal follow remarkably parallel courses from the international watershed, and enter the Baltic Sea by separate mouths.

3.—**Lakes.** Norwegian lakes are too small to be shown on a small-scale map; the only one of importance is *Lake Mjosen*, north of Christiania.

In Sweden two series of lakes may be distinguished:—

(*a*) A line of long narrow lakes at the heads of the river-valleys, high up on the plateau, e.g. Tornea Lake.

(*b*) The line of lakes in the lowland area of Svealand—Lakes Wener, Wetter, and Mälar. The two former are drained by the *river Gota, which enters the sea at Göteborg* (=Gothenburg).

4.—**The Coasts.**

(*a*) *The Norwegian coast* is a fiord coast. The fiords are long, narrow, winding openings, with steep-walled sides. They were probably formed originally as cracks in the surface, then deepened by the action of the glaciers which during the Ice Age came right down to the sea. Off the coast is a line of small islands which is sometimes called the "Skerry Guard." This line of islands cuts off between itself and the mainland a long strait of calm water which is known as the Inner Lead. This forms an important sea route along the coast.

Some of the most noteworthy fiords are Christiania Fiord, Hardanger Fiord, Sogne Fiord, and Trondhjem Fiord.

In the north the Lofoten Islands are separated from the mainland by the West Fiord. Near these islands the tidal

currents swirl round, making the famous whirlpool known as the Maelstrom.

(*b*) *The Swedish Coast* is much more regular, and is not characterised by the steep-walled fiords. A large-scale map, however, shows numerous indentations, as well as a fringe of very small islands, which though very numerous do not form a continuous waterway comparable to the Inner Lead of Norway.

5.—**Climate** (see Figs. 41 and 42). Norway and Sweden show considerable climatic differences. Norway receives the prevalent westerly winds from the Atlantic. These on encountering the mountains are compelled to rise and deposit copious rainfall on Norwegian side. Passing over the backbone of high mountains, however, they lose most of their moisture, and descend the eastern side as comparatively dry winds. Consequently, while Norway has heavy rain, at all seasons of the year Sweden has comparatively low rainfall. Moreover, Sweden has more rain in summer than in winter, being thus more continental in character than Norway.

With regard to temperature, Norway has remarkably mild winters for its latitude. Even as far north as North Cape the sea is not frozen in winter. This is due, of course, to the prevailing oceanic winds. The January temperature of the coast-lands of Norway is about 32° F., though it must be remembered that the great height of the land causes very low temperatures to be experienced in the interior. The July temperature of Norway is about 56° F., i.e. about the same as the north of Scotland. It is worthy of note that the most northerly point is practically as warm in summer as the most southerly point.

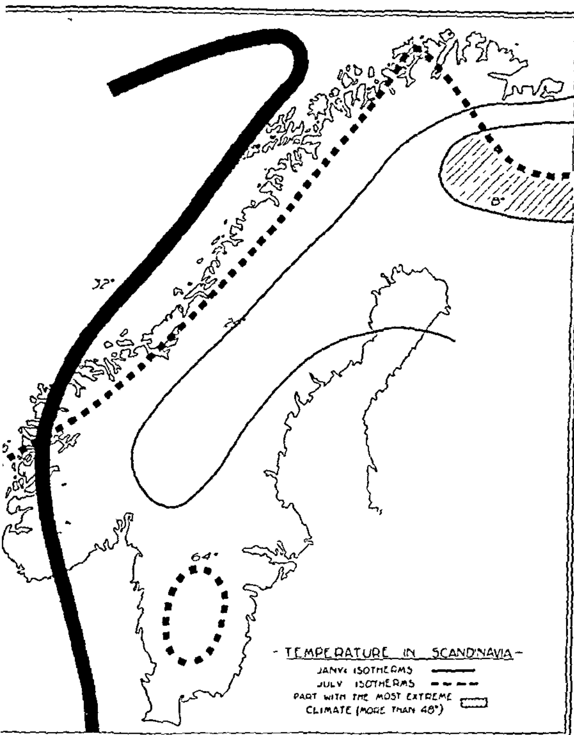
The climate of Norway is, therefore, remarkably equable, like that of the British Isles.

Sweden, on the other hand, has an extreme climate. Its winters are colder (at the same latitude) than those of Norway, and its summers considerably warmer (see the isotherms in Fig. 41). Southern Sweden has a temperature of about 64° F. in July, that is, as warm as London, which is about six degrees of latitude nearer to the Equator.

On account of the colder winters of Sweden and the surrounding lands, the Baltic Sea is frozen in winter.

The Vegetation (see Fig. 43).—The high backbone is, of course, almost devoid of vegetation. It forms a region of ice-desert, comparable to those around the Arctic coasts.

The rest of Scandinavia north of latitude 60° is largely covered with coniferous forest. On account of the greater extent of the areas of gently sloping ground these forests are more extensive in Sweden than in Norway.



32°
64°
0°
- TEMPERATURE IN SCANDINAVIA -
JANY. ISOTHERMS
JULY ISOTHERMS
PART WITH THE MOST EXTREME CLIMATE (MORE THAN 48°)

Fig. 41

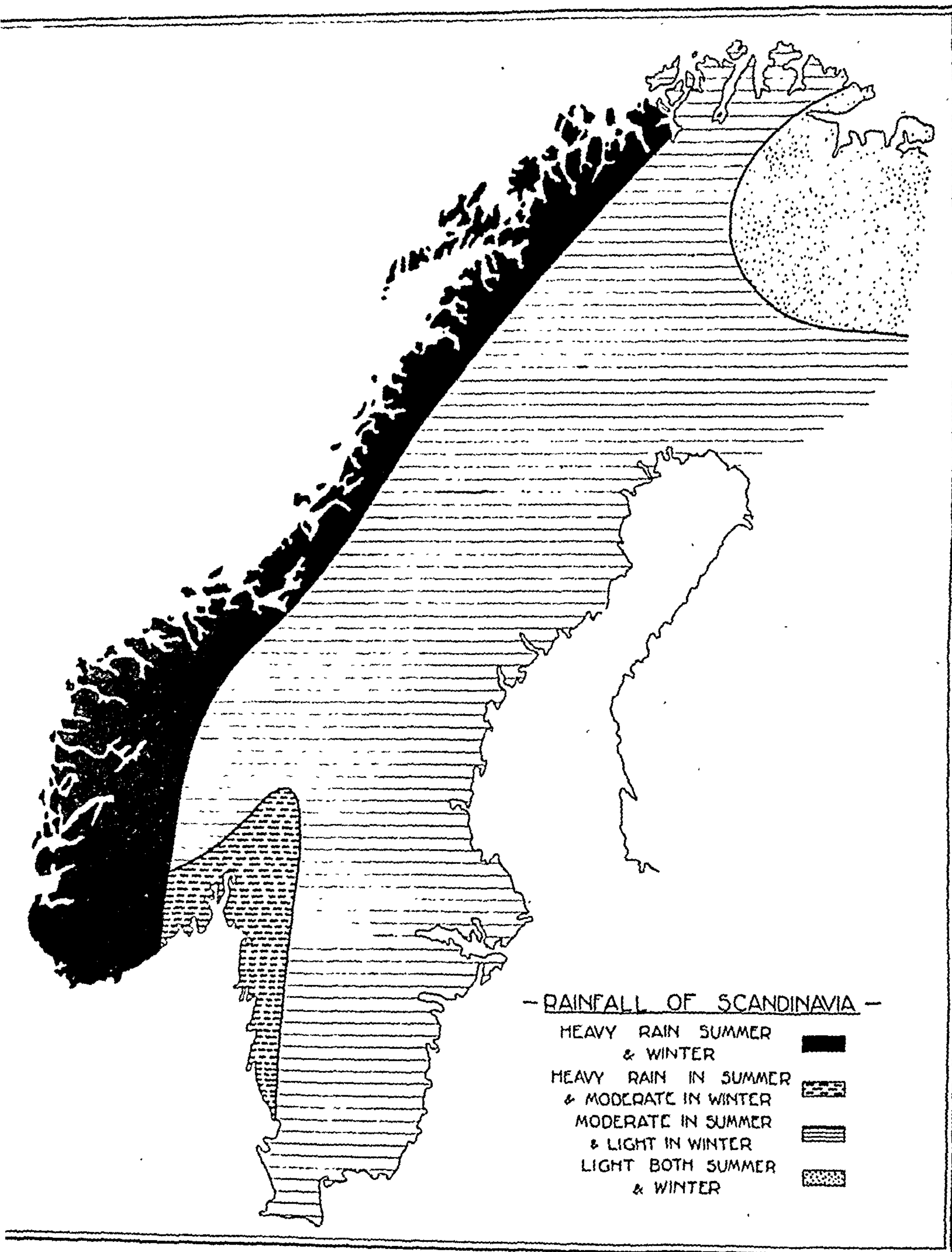

RAINFALL OF SCANDINAVIA
HEAVY RAIN SUMMER & WINTER
HEAVY RAIN IN SUMMER & MODERATE IN WINTER
MODERATE IN SUMMER & LIGHT IN WINTER
LIGHT BOTH SUMMER & WINTER

Fig. 42

South of latitude 60° N. the natural vegetation is deciduous forest (oak, ash, etc.). In the fertile lowland region, however, the forests have been nearly all cleared and the land devoted to grazing and agriculture.

6.—**The Economic Geography of Norway.**

Farming.—The area of low, fertile land in Norway is very restricted. The only large area is that around the Christiania (Oslo) Fiord. Other patches are scattered about the sides and heads of the fiords, while some mountain farms, known as "Saeters," occupy occasional "shelves" of more or less fertile ground. Agriculture is, therefore, relatively unimportant. On the fertile patches the chief cereals grown are oats and barley, the climate being too damp for wheat.

The chief form of farming is dairying, but the available grazing land is so restricted that little surplus is produced for export.

Fishing.—This occupation takes the place of farming in better endowed countries. The chief fish caught are herring, mackerel, and cod, these latter being caught mainly in the northern district round the Lofoten Islands. Whale fishing is also important in the Arctic seas, while trout and salmon are caught in the rivers.

The chief fishing ports are Bergen in the south, Tromsö and Hammerfest in the north.

Lumbering.—This is the third great industry of Norway. The timber is exported in large quantities to Britain, though some of it is first manufactured into wood pulp, which is imported by Britain and other countries for the manufacture of paper.

Mining.—Iron is mined in the southern region between Christiansand and Oslo, on the northern shore of the Christiania (Oslo) Fiord.

Shipbuilding is of some importance, and the training of the Norwegians as fishermen has led to the development of a large merchant fleet.

7.—**Routes and Towns.** The only important railway routes in Norway are:—

(*a*) From Christiania (Oslo), up the Glommen valley and thence by a low gap to Trondhjem on the west coast.

(*b*) From Oslo, across the Hardanger Field to Bergen.

(*c*) From Sweden, via Ostersund and across the plateau to Trondhjem.

(*d*) In the north from Sweden, up the valley of the Lulea and across the mountains to Narvick on the west coast.

There are few important towns:—

Oslo, formerly named Christiania, is at the head of the navi-


SNOWFIELDS & ICEFIELDS
CONIFEROUS FOREST
DECIDUOUS FOREST & MEADOWLAND

Fig. 43

gable Oslo Fiord, in the centre of the only area of fertile lowland in Norway, and at the southern end of the only important lowland gate (via the Glommen valley) across the Norwegian mountains.

Trondhjem, at the northern end of the above-mentioned cross route, is a former capital of Norway. It is at present an important fishing and tourist centre.

Bergen is an important fishing centre on the west coast.

8.—**Trade and Commerce.** The student should be able to compile for himself a list of the chief imports and exports of Norway, by considering what commodities the country produces in excess, and what commodities she lacks. In the former class, fish, timber, and iron ore form the chief exports; in the latter, coal, wheat, woollen goods, and machinery form the chief imports.

The commercial life of Norway is concentrated in the three ports of Oslo (Christiania), Bergen, and Trondhjem, though there are also many small fishing ports.

Norway has also a large mercantile marine, which acts as carrier for the commodities imported and exported by other countries.

9.—**The Economic Geography of Sweden.**

Farming.—Sweden is much more favourably endowed with fertile lowland than Norway. The whole of Sweden south of latitude 60° is fairly low and level ground, while along the Gulf of Bothnia there is a fairly extensive coastal plain.

Even in the southern peninsula, however, the summers are not hot enough for the extensive cultivation of wheat. The chief cereals are, therefore, barley, oats, and rye. Dairy farming is characteristic of the whole region, and much butter is exported from the district of Scania in the extreme south.

Lumbering—This is of even greater importance in Sweden than in Norway. Almost the whole of the country north of 60°, with the exception of the higher parts of the plateau, is covered with coniferous forest. The conifers are cut down in winter, hauled over the snow to the banks of the rivers, and floated down when the snow and ice melt in spring At the mouths of the numerous parallel rivers are situated the sawmills, which cut up the logs into timbers of the required size, and pulp mills which convert the timber into wood pulp.

Mining.—Sweden is very rich in iron ore of excellent quality. The chief iron-mining regions are:—

(*a*) The Dannemora district, near the east coast, just north of latitude 60° N.

(*b*) The Gellivare region, on the edge of the mountainous "backbone," and just north of the Arctic Circle.

Copper is mined near Falun.

Fishing.—This is not nearly so important in Sweden as in Norway, as the Baltic Sea is not only frozen in winter, but it is also less well stocked with fish than are the Norwegian seas.

Industries.—Some iron is smelted in the Dannemora region, but the lack of coal has prevented any great development in this direction.

Cotton goods are manufactured at Gothenburg, woollen goods at Norrköping, and matches at Jönköping.

10.—**Routes and Towns.** The physical map indicates two main lines of communication, viz. :—

(*a*) Northward from Malmo in the extreme south of the peninsula, midway across the fertile lowland of the south to Stockholm, thence northward along the coastal plain by the Gulf of Bothnia.

(*b*) From west to east, starting at Gothenburg, and following the line of Lakes Wener, Wetter, and Mälar to Stockholm. This route is followed both by the main line of railway which passes between Lakes Wener and Wetter, and thence south of Lake Mälar to Stockholm, and also by a waterway which follows the Göta river and Lake Wener, then goes by canal across to Lake Wetter, and by canal up the Motala river to Söderköping on the east coast.

Other great routes will be dealt with below on the basis of the towns from which they diverge. Two important routes which connect the mining regions with the Norwegian coast may, however, be noted here. They are :—

(*a*) From Dannemora, through Gefle on the coast of the Gulf of Bothnia, then via Ostersund and across the plateau to Trondhjem.

(*b*) From Lulea, at the north-east corner of the Gulf of Bothnia, up the valley of the river Lulea, through the Gellivare iron-mining region, thence by Tornea Lake and across the mountains to Narvik, on the West Fiord.

Both these lines owe their construction to the fact that, while the Baltic Sea is frozen in winter, the coast of Norway is ice-free. The construction of these lines has enabled Sweden to supply her foreign customers with iron ore at any time in the year.

Stockholm, the capital of Sweden, is situated on a number of islands at the entrance to Lake Mälar. It is, therefore, sometimes called "The Venice of the North." The following routes diverging from it should be drawn on a sketch map to indicate the factors which have caused it to become so important :—

(*a*) Westward by the line of lakes, rivers, and canals to Gothenburg.

(*b*) Westward by the main east-to-west land route south of Lake Wener to Gothenburg.

(*c*) North of Lake Wener to Oslo (Christiania).

(*d*) South-westward through Norrköping to Carlscrona and Malmo at the southern end of the peninsula.

(*e*) Northward through Gefle, thence across the plateau to Trondhjem.

(*f*) Round the coast of the Gulf of Bothnia, through Gefle, Umea, and Tornea, and thence through Finland to Petrograd (Leningrad).

(The student should attempt to find for himself any more suitable place for the meeting-point of these great routes. His inability to do so will impress upon his mind the influence of converging routes upon the development of important cities.)

Gothenburg is the chief port of Sweden. Situated on the North Sea entrance to the Baltic, it is in a more favourable position for world trade than Stockholm. From it routes to Christiania (Oslo), Stockholm, and Malmo should be traced on the map.

Malmo, at the southern end of the peninsula, is connected with Copenhagen by train-ferry. Being the port for the rich dairying district of southern Sweden, it exports considerable quantities of butter and eggs.

Carlscrona is the Swedish naval station in the Baltic.

Upsala is a university town and a former capital of Sweden.

Chapter XII

SWITZERLAND

1.—**Physical Divisions.**—Three distinct physical divisions may easily be recognised on the map of Switzerland. They are, from north to south :—

(1) The Jura Mountains.
(2) The Swiss Plateau.
(3) The Alps (see Fig. 44).

2.—**The Jura Mountains,** which lie in the north-west of Switzerland, on the boundary with France, are composed of many parallel ridges of limestone, between which lie long parallel valleys running from south-west to north-east. The mountains rise to heights of over 3000 feet, but there are no great outstanding peaks, though Mount Tendre, north of the Lake of Geneva, rises to 5510 feet. The valleys are nowhere less than 1200 feet high. Each ridge of the Juras is the top of a fold, somewhat like the arch of the Pennines, or that of the Weald, though in the Juras not so much of the arch has been worn away as in the case of these English folds.

3.—**The Swiss Plateau.** This is approximately the region shown on the coloured physical map between the 3000 feet contour which marks the south-eastern edge of the Juras, and the 3000 feet contour which marks the northern edge of the Alps.

The plateau, though by no means level, lies between the heights of 1200 feet and 3000 feet. The rocks of which the plateau is composed are chiefly sandstones and shales, though overlying them are deposits of mud and clay laid down in past ages by rivers and glaciers.

4.—**The Alps.** These form a very complex system of moun-
ains, and though they extend much beyond the borders of Switzer-
nd it will be convenient at this point to study the general features
the Alps as a whole. The physical map of Europe shows the
ps as forming a great bow or arc, beginning in the north of Italy,
ere they are separated from the Apennines by the Col de Tenda.
om this point the ranges run westward, then northward through
tern France and northern Italy. Through Switzerland the
untains, considered as a whole, run approximately west to

out as they pass into numerous parallel valleys in the Austrian Tyrol, and deep . the Trentino district of northern Italy.

The individual ranges of the Alps are best considered along with the rivers.

5.—**The Alpine Rivers.** Mount St. Gothard, just north of the boundary between Italy and Switzerland, is not only the

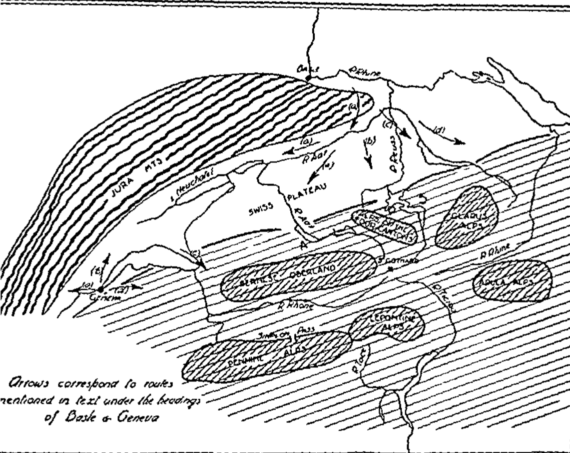


Fig. 44

central point of the Alps, but is also the centre of the river system. The following rivers flowing from it should be traced, first on the diagram map (Fig. 44), then on the Atlas map:—

(*a*) North-eastward flows the Vorder Rhein, which, after forming for some distance the boundary between Switzerland and the Austrian Tyrol, enters Lake Constance. From this lake, which is entirely in Germany, the river flows westward, forming approximately the boundary between Switzerland and Germany. (Note, however, that the town of Constance on the southern side

of the lake is in Germany, while around the Falls of Schaffhausen Swiss territory extends for some ten miles north of the Rhine.)

(*b*) The Reuss flows northward from the St. Gothard mass, through the Lake of Lucerne, then across the Swiss plateau to join the Aar. An important tributary is the Limmat, which drains the Lake of Zurich.

(*c*) The river Aar flows in a general north-westerly direction, drains Lakes Brienz and Thun, then flows across the plateau by Berne, the capital of Switzerland. Below the town of Biel it receives a tributary from Lakes Neuchâtel and Biel, and the combined stream flows north-eastward along the southern foot of the Juras, to join the Rhine at Waldshut.

(*d*) The Upper Rhone forms a deep valley in line with, though opposite in direction to, that of the Upper Rhine. At Martigny it makes a striking right-angle bend to the north-west, then enters the Lake of Geneva. Here its waters are filtered by the speed of the current being checked, and when the Rhone leaves Lake Geneva, at Geneva, it is a clear stream. The alluvium thus deposited has built up a delta-like fan at the eastern end of the lake.

(*e*) The river Ticino flows southward from the St. Gothard mass, through Lake Maggiore. This lake also receives the river Toce which rises not far from St. Gothard.

The only important river of Switzerland which is not included in the radial system described above is the Doubs. This river, which drains the western valleys of the Juras, has very little of its course in Switzerland. It is a tributary of the Saône, which in its turn joins the Rhone.

6.—**The Ranges of the Swiss Alps.** Just as the St. Gothard area was seen to be the centre of the river system of Switzerland, so also is it the centre from which many of the most important ranges diverge. The positions of the Glarus Alps, the Adula Alps, the Lepontine and Pennine Alps, and the Bernese Oberland may be memorised from the diagram map (Fig. 44), but they should also be noted on the coloured physical map.

Mont Blanc (15,780 feet), the highest mountain of the Alps, may be considered from its position as an extension of the Pennine Alps, although structurally the two are quite separate.

7.—**Glaciers and their Work.** The Swiss mountains are so high that their summits are covered with snow all the year round. The snow accumulates from year to year, and is pressed down to form ice, which travels slowly down the valleys as a glacier. These glaciers move very slowly, the average rate being only one foot per day. As they creep down the valleys, they grind up the rocks into small pieces, and deepen the floor of the

valley. When the glaciers melt, the mud and stones brought down by it are deposited as a mixed mass of clay and boulders known as "moraine" or boulder clay. The fact that such boulder clay is found to-day, not only in the lower valleys of the Alps, far below the present limit of the glaciers, but also right out on the plateau, is a proof that the Swiss glaciers formerly extended much further than they do at present.

Another effect of the past and present glaciers is that many of the Swiss valleys are U-shaped (see Fig. 45); that is, instead of having the gently sloping sides of ordinary river valleys, they have steep, and in places precipitous, sides, over which tributary streams dash in waterfalls which form one of the chief glories of

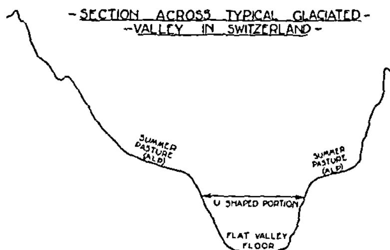


Fig. 45

Switzerland. *Above the steep-walled part of the valley, however,* the slopes are again more gradual for some distance, until the bases *of the high peaks are reached. This high shelf of comparatively* level ground is termed by the Swiss an "alp."

8.—**The Climate of Switzerland.** *The most noteworthy* feature of the climate of the country is the way in which it illustrates the effect of altitude on temperature and rainfall.

On the plateau the climate is rather extreme. Although a sea-level isotherm map of Europe shows the whole of Switzerland as having a temperature of over 32° F. in winter, the actual temperatures, on account of the elevation of the land, are much lower. Thus the plateau has an average January temperature of about 30° F. In July the temperature is about 68° F This fairly great range of temperature is due to the distance of Switzerland from the moderating effect of the sea.

Rainfall is, except in the very sheltered valleys, rather high, amounting on the plateau to about 35 inches per year, most of which falls in the summer half of the year.

In the Alps the rainfall increases with altitude, the higher mountains having very heavy rainfall (or snowfall), though some of the low valleys are very dry. The temperature also decreases with altitude, the average rate of decrease being about 1° F. for every 300 feet of ascent.

9.—**The Föhn.** This is a warm, dry wind which frequently blows from the south down the Swiss valleys. It is due to the fact that winds which, on the Italian side, had to rise, expand, and lose their moisture, pass down to the Swiss valleys and so fall, contract, and take up moisture. These warm, dry winds have a marked effect, especially in early summer, in melting the snow and laying bare the high pastures.

10.—**The Vegetation of Switzerland.** On the Juras the soil is poor and the climate rather extreme, consequently the vegetation on the higher land is mainly rather poor pasture, while on the slopes are forests of coniferous trees.

On the plateau the natural vegetation was mainly deciduous forest, but this has been largely cleared and its place taken by meadows and rich pastures.

In the Alps the vegetation varies markedly with the altitude.

In the lowest valleys, particularly those facing south, trees like the walnut and chestnut flourish; higher up the vegetation consists of meadows and deciduous trees, such as oak and beech; still higher is a belt of coniferous trees, and above which, on the real "alp" (see above) are the patches of grass-land which form the summer pastures. Above the "alps" the climate is too cold for any vegetation beyond bushes and mosses.

11.—**Farming in Switzerland.** On account of the mountainous nature of the country more than one quarter of the surface of Switzerland is rendered useless from an economic point of view (unless the attraction offered to tourists by the scenery is reckoned as economic value). In addition to this barren area one-seventh is forest-land. Of the productive land the portion devoted to grazing and meadow-land far exceeds that devoted to arable and fruit farming.

Pastoral Farming.—Cattle-rearing is most important on the plateau, where the more level ground, fertile soil, and abundant rainfall make conditions suitable for dairy-farming. Cattle are also fed, in summer time, on the high pastures of the "alps"; in winter they are led down to the farms in the valleys to be fed on the hay and root crops grown there during the summer.

Sheep-farming is not important, except on some of the high

pastures of the Juras. Goats take the place of sheep in the mountainous areas.

The surplus milk is tinned and exported as condensed milk, or made into cheese, or milk chocolate.

Arable Farming.—This is confined mainly to the sheltered valleys. Wheat, maize, beet, oats, and root crops are all cultivated, but Switzerland cannot supply her own requirements, and has to import cereals. Vines are only cultivated in the most sheltered valleys. Flax and hemp are also cultivated.

12.—**Industries in Switzerland.** From an industrial point of view Switzerland is handicapped by:—

(*a*) Her lack of coal and iron.
(*b*) Her lack of raw materials.
(*c*) The distance from the coast.

To counteract these, however, she has abundant water power and excellent railway connection with all parts of Europe, while her people display considerable skill in the manufacture of articles requiring exact and careful manipulation.

Consequently the Swiss manufactures are all such articles as are very valuable in proportion to the amount of raw material which they contain, e.g. watches, clocks, lace, silk goods, etc.

Cotton manufacture is carried on at Zurich, St. Gallen, and Appenzell; silk goods are made at Zurich and Basle; watches at Geneva, and clocks in the villages of the Juras. Aluminium is smelted near the Falls of Schaffhausen.

Other industries include the manufacture of comparatively costly leather goods from the "kid" of the goats The manufacture of condensed milk, cheese, and chocolate has already been referred to.

13.—**Routes and Town Sites.** Basle and Geneva are the great centres controlling the exits from Switzerland via the Rhine valley and the Rhone valley respectively.

From Basle, the following railways radiate through Switzerland:—

(*a*) On the southern foot of the Jura, via the Aar valley to Lake Geneva.

(*b*) Via Olten and Lucerne, thence up the valley of the Reuss, and through the St. Gothard tunnel to the valley of the Ticino in Italy.

(*c*) Via Zurich and Lake Zurich to the Rhine at Ragatz. The valley of the Vorder Rhein is followed up to Dissentis, and another railway crosses the Rhaetian Alps and the valley of the Inn (known as the Engadine), and so to the Val Tellina in northern Italy

(*d*) Via Zurich and St. Gallen, round the eastern end of Lake Constance.

(*e*) Via Olten, Berne, and Thun, thence by a tunnel through the Bernese Oberland to Brieg, and via the Simplon Pass into the valley of the Tree in northern Italy.

From Geneva the main lines run :—

(*a*) Westward to Lyons.

(*b*) North of Lake Geneva, via Lausanne to Berne and Basle.

(*c*) Via Lausanne, up the Rhone to Martigny and Brieg, then through the Simplon Pass to Italy.

(*d*) Via the river Arve to Chamonix, to join the Rhone valley at Martigny.

Berne, the capital, is situated in the middle of the plateau, at the natural meeting-place of the Swiss railway routes.

Chapter XIII

GERMANY

Physical Divisions.—From the points of view of relief and structure Germany may be divided into three clearly marked divisions, viz.:—

A. The Rhine Basin.
B. The Southern and Central Highlands.
C. The Northern Plain.

Each of these regions will be described in turn.

A.—THE RHINE BASIN. (See Fig. 46)

1.—**The Course of the Rhine.** The upper course of the Rhine has already been dealt with in the section on Switzerland. From Lake Constance the Rhine flows westward past Schaffhausen, where it dashes over belts of hard rock, forming waterfalls. Around Schaffhausen the boundary between Germany and Switzerland lies north of the Rhine, so that a small area on the right bank of the river is here included in Switzerland.

At Basle, which is on the Swiss side of the boundary, the Rhine turns northward and flows for a hundred miles along a broad flat-bottomed valley between the Vosges on the west and the Black Forest mountains on the east. In this section it receives two tributaries, viz.:—

(*a*) The river Ill, which flows at the eastern foot of the Vosges, parallel to the Rhine, to join it at Strasbourg.

(*b*) The river Neckar, which rises in the Black Forest, and flows northward along the eastern side of that mountain mass, then round the northern end of it to join the Rhine at Mannheim. In the section between Basle and Carlsruhe the Rhine forms the boundary between France and Germany.

At Mayence the tributary river, the Main, enters on the right bank. This river rises in the Fichtel Mountains at the north-western corner of the Bohemian portion of Czecho-Slovakia, and pursues a characteristic zig-zag course roughly along latitude 50° N., through Frankfurt to Mayence.

Below Mayence the Rhine flows for some distance westward, accepting the course of its tributary the Main. At Bingen, how-

(*e*) Via Olten, Berne, and Thun, thence by a tunnel through the Bernese Oberland to Brieg, and via the Simplon Pass into the valley of the Tree in northern Italy.

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ever, it turns northward to flow through a deep gorge between the plateaux of the Hunsrück on the west and the Taunus on the east. The river Lahn is a right bank tributary flowing on the northern

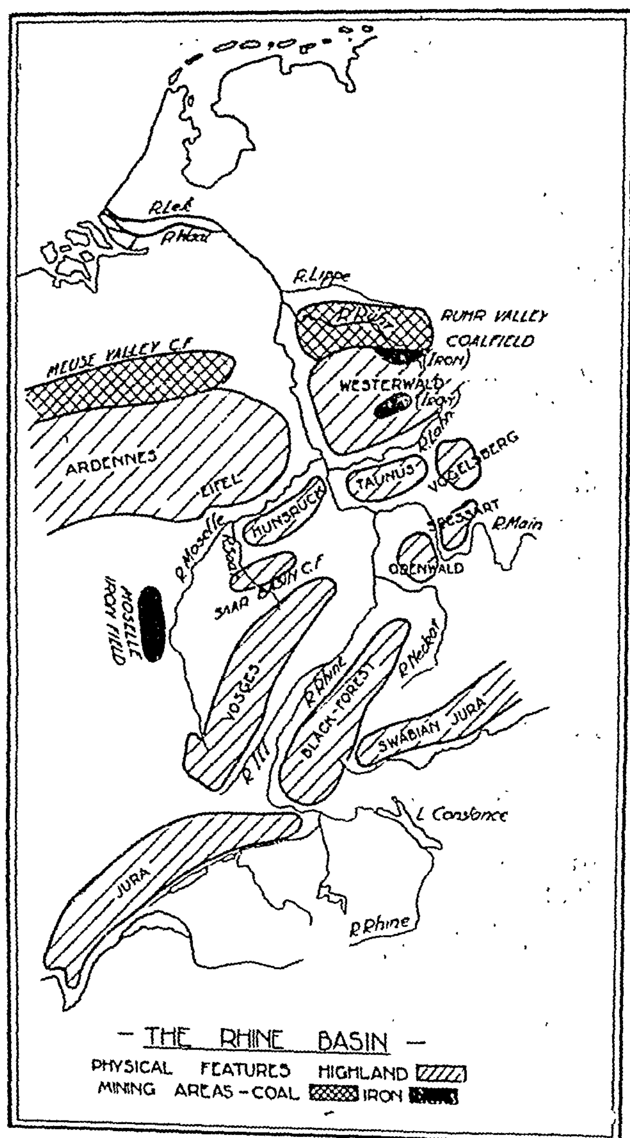


Fig. 46

side of the Taunus plateau. At Coblenz ("confluence") the Moselle enters the Rhine. This river rises on the western slopes of the Vosges, flows northward through Toul and Metz, then forms for a short distance the boundary between Germany and the little state of Luxemburg. Beyond Treves the river flows

in a deep gorge between the Eifel plateau (a continuation of the Ardennes) and the Hunsrück, to join the Rhine at Coblenz. The Rhine gorge is continued beyond Coblenz to Bonn, where it receives the little tributary the Sieg on the right bank.

Below Bonn the valley leaves the high land and opens out on to the European plain, though the Eifel plateau on the west and the Westerwald on the east continue the highland region for some distance on each side of the river. Cologne marks approximately the beginning of the " plain stage " of the Rhine's course. At Duisburg the river Ruhr, which flows along the northern edge of the Westerwald, enters the rhine. The river Lippe, joining the Rhine at Wesel, is the last important tributary. The main stream enters Dutch territory near the town of Emmerick.

2.—**Natural Divisions of the Rhine Basin.** If the above description has been worked out on the coloured physical map the student will have realised that the Rhine flows through several different types of country. The detailed geography of the region can most conveniently be studied on the basis of these natural divisions, which are, from south to north :—

(i) The Rift Valley.
(ii) The " confluence " region round Mayence.
(iii) The Rhine Gorge and the northern plateaus.
(iv) The plain stage below Cologne and the Ruhr valley.

3.—**The Rift Valley.** This is the region between the Black Forest on the east and the Vosges on the west. The valley was formed by the slipping down of a great block of land between the Vosges and the Black Forest, which were thus left standing up as plateaus. It is therefore called a rift (=break) valley, and is similar in structure to the midland valley of Scotland.

The French side of this rift valley and the Vosges highland region have already been described (see section on France). The German side of the valley and the Black Forest highland are very similar to these French regions.

The Black Forest, as its name implies, is a forested highland, largely covered with coniferous trees. This forest is the basis of a considerable lumbering industry, the logs being rafted down the tributary streams to sawmills situated at the foot of the hills. The peasants also manufacture wooden toys during the winter months.

In the clearings of the forest and lower down the mountain sides are good pasture lands and meadows on which cattle are reared. Still lower, cereals such as wheat, oats, and barley are grown, while in the warmer valleys of the foothills and in the sheltered Rhine valley wheat, maize, and vines are cultivated.

The Rhine is navigable for small steamers up to Strasbourg, and boats can with difficulty reach Basle.

The important towns on the German side of the Rift Valley are :—

Freiburg, situated on a tributary valley of the Rhine, amid one of the most prolific vine-growing areas of the Black Forest region; and Carlsruhe, which is the capital of the territory of Baden.

4.—The "Confluence" Region of the Middle Rhine. This is the area between the northern end of the Black Forest and the southern side of the Taunus. It is drained by the three rivers Rhine, Neckar, and Main, and forms a large lowland basin, below 600 feet, ringed round by the Bavarian plateau on the east, the Taunus on the north, the Hunsrück on the west, and the Black Forest on the south. Between the Neckar and the Main is the roughly circular highland mass of the Odenwald, and within the arms of the last great bend of the Main is the elevated region known as the Spessart.

The whole region enjoys mild winters, being sheltered by the surrounding mountains; the summers are warm and sunny; the soil is largely fertile alluvium. Consequently this is a rich agricultural region, growing wheat, rye, barley, and oats, while vineyards and orchards flourish throughout the whole region.

Because of the fertility of the area, and the valley-routes leading eastward from the Rhine to central and eastern Europe, many important cities have grown up in this section :—

Mannheim, at the confluence of the Rhine and the Neckar, not only controls the land routes along these valleys, but is also the most important river port in southern Germany. Lines of barges are drawn up the Rhine by steam tugs, bringing wheat, coal, and oil from the sea, and taking back timber from the Black Forest region.

Heidelberg is an old and picturesque university town situated on the Neckar, where that river enters the plain of the Rhine.

Heilbronn is the head of navigation of the Neckar.

Stuttgart on the Neckar is an important boot-manufacturing centre.

Mayence (Mainz), being at the confluence of the Main and the Rhine, thus controlling the most important land and river routes in the area, is the largest city of this section. It has some miscellaneous manufactures, and is an important river port.

Darmstadt is a legal centre and an important railway junction.

Frankfurt-on-Main, so called to distinguish it from Frankfurt-on-Oder, is situated on the northern or right bank of the Main, in a region which is so fertile as to have earned the name of the "Garden of the Rhine." It is an important river port, and a great banking centre (it was the original home of the Rothschilds); near-by towns manufacture leather and jewellery.

Wiesbaden, situated on the right bank of the Rhine, opposite Mayence, has mineral springs which, combined with the beautiful scenery around, have made one of the most fashionable of Europe's inland resorts.

The following railway routes in this region should be traced on the physical map, and inserted in a sketch map:—

(*a*) Up the Rhine through Mayence, Worms, and Mannheim, to Strasbourg and Basle.

(*b*) From Mayence, up the Main, through Frankfurt and Würzburg, thence across the Bavarian plateau to Nürnberg, and thence down the Danube valley to Vienna.

(*c*) From Mannheim and Carlsruhe to Stuttgart, and thence to Munich and Vienna.

(*d*) From Frankfurt northward between the Taunus and the Vogelsberg to Cassel and north Germany.

5.—**The Rhine Gorge and the Northern Plateaux.** This is the region between Bingen and Bonn, and includes the Hunsrück and Eifel on the western side and the Taunus and Westerwald on the eastern side.

The plateau regions are rather [illegible] sheep and cattle grazing The ch[illegible] rye, rather than wheat In the [illegible] the Moselle and the Lahn, however, wheat and vines are extensively cultivated.

The Saar basin, a coalfield drained by the canalised river Saar, a tributary of the Moselle, belongs to this region It has already been described in the section dealing with France, under the heading of the Franco-German frontier region (see page 129).

Both the Rhine and the Moselle have cut deep gorges through the plateaux, and all along the banks of the Rhine, between Bingen and Bonn, are ruined castles which were once the strongholds of princes who in the Middle Ages levied toll on the traffic which passed up and down the rivers. The value of the Rhine valley as a highway is indicated by the fact that in this difficult portion of the valley railways and roads have been constructed on both eastern and western sides.

Coblenz is the most important town in this region. Situated at the confluence of the Moselle and the Rhine, just below the confluence with the Lahn, the city controls not only the route by the Rhine, but an important cross-route from France, via Metz and Treves, down the Moselle, then up the Lahn to Cassel and the north German plain.

Bonn is a university town, situated where the Rhine valley begins to open out to the plain.

6.—**The Plain Stage and the Ruhr Basin.** On the

northern edge of the Westerwald is the richest coalfield of Germany. This coalfield, which extends as far north as the river Lippe, is cut in two by the valley of the Ruhr. Iron ore is also mined on the edge of the Westerwald, consequently this region has become one of the most important iron and steel manufacturing districts of Germany. The local iron is, however, nearly exhausted, and great quantities are imported from Sweden and some from the French ironfield of Lorraine.

Local supplies of wool were early obtained from the sheep runs on the barren uplands of the Westerwald and Eifel, and this region has consequently developed the manufacture of textiles. Raw materials are now imported via Rotterdam and the lower Rhine.

The industrial towns of this region may be grouped in two lines. North of the Ruhr one line begins with Duisburg, a great river port at the confluence of the Ruhr and the Rhine, passes through Essen, formerly the chief centre for the manufacture of German armaments, and through Bochum and Dortmund, both noted centres of the iron and steel industry.

The southern line of towns is formed by Düsseldorf, Elberfeld, and Barmen.

Düsseldorf, situated on the Rhine, is an important river port, which has varied manufactures, of which the chief are metal goods. It has been termed the "Birmingham of Germany."

Barmen and *Elberfeld* are twin towns engaged chiefly in the manufacture of woollen, cotton, and silk goods. These towns are sometimes called the "Manchester of Germany."

Crefeld, some distance to the west of the Rhine, specialises in the manufacture of silk and velvet.

Aix-la-Chapelle, near the joint boundary between Belgium, Holland, and Germany, belongs industrially to this region. The Meuse valley coalfield extends into the area round the town, and iron, lead, zinc, and glass are manufactured.

Cologne is situated where the great west-to-east route of Europe, from Paris along the Meuse valley and the northern edge of the Ardennes to Berlin, crosses the great north to south route of the Rhine. It is also the head of navigation of the Rhine for small sea-going steamers, and is therefore an important port. It has shared in the industrial development of the Ruhr basin, having manufactures of textiles, scent, cocoa, chocolate, etc.

Mülheim is an industrial suburb of Cologne.

7.—**Communications.** The importance of the Rhine as a navigable highway, and the great river ports of Duisburg, Düsseldorf, and Cologne, have already been mentioned. Unfortunately, from the German point of view, the river leads the

traffic to and from the Dutch port of Rotterdam. In an endeavour to divert the traffic to German ports, canals have been constructed from the river Lippe to the Ems, down which goods are conveyed to the port of Emden. An extension of the canal leads from the Ems, through Bielefeld to the point on the Weser where it makes its great right-angle bend to the north.

Numerous railways also connect the industrial region of the Ruhr and the lower Rhine with Bremen, Hamburg, Amsterdam, Rotterdam, and Antwerp, all of which ports share in the export of the manufactured goods, and in the import of the foodstuffs and raw materials.

B.—THE SOUTHERN AND CENTRAL HIGHLANDS

This region may be divided into six sections on the basis of the physical and structural features. They are :—

(1) The German Alps.
(2) The Bavarian Plateau.
(3) The Swabian and Franconian Jura.
(4) The Central Scarp Lands.
(5) Saxony.
(6) The northern region, between the rivers Rhine, Saal, and Main.

These subdivisions are shown in Fig. 47.

1.—**The German Alps.** The Alps of Switzerland extend a little way north of the German border, but the mountains here are low, nowhere reaching 10,000 feet, and the section is noteworthy only as a boundary zone. Note how nearly the boundary coincides with the 3000 feet contour line.

2.—**The Bavarian Plateau.** This is a triangular region bounded on the south by the Alps, on the north by the Swabian and Franconian Jura, and on the east by the Bavarian Forest.

The River Danube rises on the eastern side of the Black Forest, flows north-eastward along the foot of the Swabian Jura, then at Ratisbon, where it receives the tributary stream, the Naab, flowing from the Fichtel Mountains, it turns south-eastward to flow in a deep valley at the foot of the Bavarian Forest, to cross the boundary between Germany and Austria at Passau. The Danube in this part of its course receives several tributaries from the Alps, the chief being the Isar, the Inn, and its tributary the Salza.

The Climate of this region is influenced by two factors, viz. : (*a*) Distance from the sea : this gives a rather extreme climate with cold winters and hot summers. (*b*) Altitude : the plateau, apart from the Danube valley, is everywhere over 1200 feet,

and this height increases towards the south. Hence the south of the area, being higher, is no warmer than the north. The altitude also accounts for the relatively high rainfall.

Farming.—The soil in this region varies greatly, being composed of sand in some areas, and heavy clay in others. In some

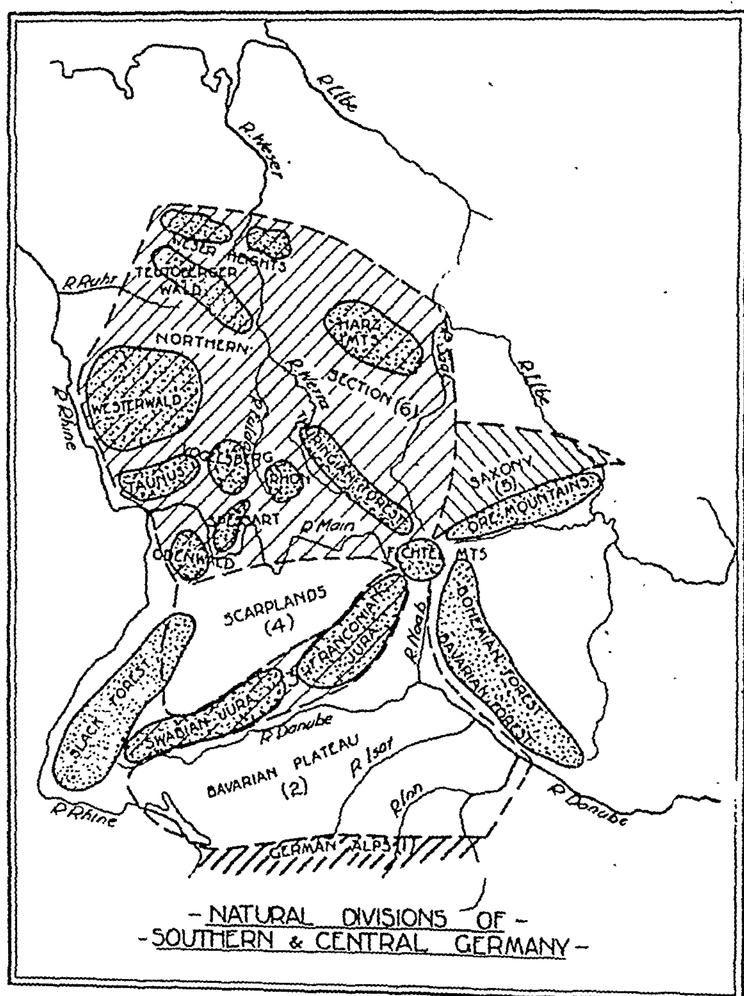


Fig. 47

regions, however, sand and clay are mixed to form a fertile soil, while the alluvium of the Danube valley is one of the richest soils in Europe.

Dairy-farming is consequently of greater importance in most of the area than arable farming. The chief crop is hops, which form the basis of the brewing industry of Munich.

Towns.—The most important city of this region is Munich.

This city is situated on the river Isar, in the centre of a great hop-growing region. It is therefore a gr in addition, some manufacturing, e.g. ost of its importance, however, to its eat cross-roads of Europe. Here meet the route from Berlin southward to Italy, and the cross-route from France via Stuttgart to Austria and the East.

Ulm marks the point where the Danube becomes navigable for boats, while Ratisbon marks the beginning of steamer navigation of the river.

3.—**The Swabian and Franconian Jura.** These ranges of hills, which are shown on the sketch map (Fig. 47), are a continuation of the Swiss Juras. Like them, they are composed of limestone, and are relatively infertile, being devoted mainly to pastoral farming.

4.—**The Central Scarp Lands** lie between the Swabian and Franconian Jura on the south, the Thuringian Forest on the north, the Black Forest, Odenwald and Spessart highland areas on the west, and the Bohemian Forest on the east. Here various belts of rock crop out around a central basin In the west sandstone crops out. This forms the forested region of the Black Forest, and the Odenwald. Farther east are layers of limestone, which also form a rather unproductive soil. In the centre, however, the occurrence of clay accounts for one of the most fertile agricultural regions of Germany. The chief crops are hops, beet, wheat, barley, oats, and rye, with vines in the sheltered valleys of the Main and other rivers.

Towns and Industries—It will be noted that this region, including as it does the greater part of the rivers Main and Neckar, overlaps the Rhine basin Consequently, for an account of the towns and industries of the western part of the present area the student should refer to the account of the "confluence" region of the Middle Rhine.

Nürnberg is the centre of the scarp land area, and owes much of its importance to the routes which diverge from it in all directions. Note particularly the north to south route from Berlin to Italy (see above under "Munich"), and the route from Frankfurt through Nürnberg and Ratisbon to Passau and Vienna.

Nürnberg is also noteworthy for the manufacture of toys. Originally based on the ample local supplies of wood and the traditional skill of the inhabitants, this industry has now developed many branches, which necessitate the importation of large quantities of raw material.

Bamberg marks the limit of navigation of the Main. From it

the Ludwig Canal ascends a tributary of the Main, then crosses over a high gap between the Swabian and Franconian Jura, and thence down to the Danube at Ratisbon. This canal thus gives complete water connection from the mouth of the Rhine to the Black Sea. Unfortunately it is small, and is not at present of great use.

5.—**Saxony.** This region is a plateau on the northern side of the Ore Mountains and between the Elbe and its tributary the Saal. In the south the height of the land and the infertility of the soil is unfavourable to agriculture, and most of the ground is devoted to cattle and sheep rearing. In the north of the region, where the land is lower, and the soil more fertile, the chief crops are rye and potatoes.

The region owes its importance chiefly to its minerals.

Coal is found on the northern edge of the Ore Mountains, in basins around the towns of Zwickau and Chemnitz. Formerly iron and silver were mined in the Ore Mountains, but the silver is now entirely worked out, and the iron nearly so. The steel industries of Chemnitz are largely kept going by imported ore. Other industries in this region are the manufactures of cotton, wool, lace, porcelain, clocks, and paper.

Dresden is the capital of Saxony, and commands the route via the Elbe from Germany into Bohemia. "Dresden" china is now manufactured chiefly at Meissen, not far from Dresden.

Leipzig, though really a city of the plain, may be said to belong to this region, for it owes much of its importance to the numerous routes which centre on it from the highlands of the Thuringian Forest and the Ore Mountains. It is a well-known centre for printing and the manufacture of musical instruments.

6.—**The Northern Highland Region.** This region lies between the rivers Saal, Main, and Rhine, and includes the highland areas of the Thuringian Forest, the Harz Mountains, the Taunus, and the Westerwald. As the two latter regions have already been included with the Rhine basin, they will not be again described here.

Farming.—The fertility of the soil varies very widely in different parts of this district, for we have within the region the same succession of sand, clay, and limestone which were met with in the Central Scarp lands. Consequently much of the land is given up to cattle and sheep farming. The valleys of the rivers, e.g. the Fulda, the Werra, which unite below Cassel to form the Weser, are very fertile, and here cereals and root crops are extensively cultivated.

Minerals.—The Harz Mountains form one of the richest metal-mining districts of Europe. Here silver, iron, copper, and an inferior kind of coal known as lignite, are mined.

At Stassfurt, a little to the north-east of the Harz Mountain is the world's most important deposit of "salts," which includ common salt and various compounds of potassium.

Iron is mined near the northern border of the region nea Bielefeld, while coal is also found in the same region.

Routes and Towns.—The Werra and the Fulda, which unite to form the Weser, provide the chief north to south route through the region. An important cross-route from Frankfurt runs between the Vogelsberg and the High Rhon, down the upper Fulda, thence through the towns of Gotha, Erfurt, and Weimar, and down the Saal to Halle, on the river Saal.

Cassel is the focus of the routes in the northern part of this region.

C.—THE NORTHERN PLAIN

1.—**Rivers.** The German plain is drained by the Ems, the Weser, the Elbe, and the Oder. In the east, the "Polish corridor" runs alongside the lower Vistula, thus separating East Prussia from the rest of Germany. A characteristic feature of these rivers is that although the main streams pursue a fairly regular course from south-east to north-west, the chief tributaries flow from east to west, e.g. the Warthe tributary of the Oder and the Spree flowing to the Elbe. It will be noted that these two tributary streams form an almost complete east to west waterway along the middle of the north German plain, which is continued through Poland by the river Bug, a tributary of the Vistula. This great valley running from west to east across the German plain was formed during the later part of the great Ice Age many thousands of years ago. The great ice sheet, which had covered all the north of Europe, gradually retreated northward, until it reached the line now occupied by the lower Elbe, the Spree, the Warthe, and the Bug. The rivers which flowed from the southern highlands found their way to the Baltic blocked by the sheet of ice, and their courses were thus diverted to the west, so that they were all tributaries of the lower Elbe. When the ice sheet completely melted the rivers found their way to the Baltic, but the east to west valley they cut still remains as a great depression, occupied in part by the rivers named above. The Spree and the Oder, the Warthe and the Bug have been joined by canals which follow the line of the old valley.

2.—**Coast-line and Relief.** Of the 1100 miles of German coast, only 300 front on the North Sea, round the mouths of the Ems, Weser, and Elbe. This portion of coast is, therefore, of great commercial importance to Germany, although the shallowness of the sea and the frequency of fogs make it rather difficult

of navigation. The above commercial disadvantages were, however, of great value to Germany during the Great War, in facilitating coastal defence. The island of Heligoland, at the centre of the semicircle of the German North Sea coast, was the centre of her naval defences.

The Baltic coast shows several long, narrow peninsulas jutting out eastward, and cutting off almost land-locked bays. These bays are known as haffs (e.g. the Stettin Haff, the Kurisches Haff, and the Gulf of Danzig). The spits are really sandbanks, built up by the eastward flowing currents of the Baltic Sea. The actual coast-line of northern Germany is formed by a line of sand dunes which is a continuation of the dunes of Holland and Belgium. Inland from this is a belt of marsh. South of this is a line of sandy hills which form the Baltic Heights. Only in a few places do these heights rise to over 600 feet, hence they do not show very prominently on the physical map of Central Europe. They form, however, a distinct line of hills running across the whole of north Germany. In East Prussia the hollows between the hills are filled by numerous lakes occupying the region named the Masurian lake-plateau.

South of the line of Baltic Heights is the great trough which was mentioned in the preceding paragraph as a remnant of the Ice Age.

3.—**Climate of the German Plain.** As was pointed out in the introductory section on the Climate of Europe, the isotherms run from north to south in winter; that is, as we move eastward through Germany the winters become colder. The Rhine valley has average January temperatures above freezing-point; the Elbe is just below 32° F. in January; while the Oder has a temperature of about 24° F. The eastern part of Germany is frozen, on the average, for about three months in the year.

In summer time the isotherms run from west to east, and the whole of Germany lies between the sea-level isotherms of 64° F. and 72° F. Actually, however, the south of the country is very little warmer than the north, on account of the increase of elevation as we go southward.

The range of temperature in Germany, as will be seen from the above, increases to the east and south-east. Germany is, therefore, intermediate in climate between the equable west and the extreme interior.

The rainfall of the German plain varies from about 15 inches to 30 inches per year, except where the height of the land causes exceptional rainfall. Germany is, therefore, drier than any part of Britain except south-eastern England. Most of the rain falls, however, during the summer half of the year, i.e. when it is of most

use. Consequently, no part of the country has insufficient rainfall for the cultivation of crops.

4.—**Farming on the German Plain.** The chief cereal of the plain is rye, which is made into the so-called black bread which is the chief food of the people. This crop will grow on a sandy soil, and can therefore be cultivated on the sandy lands of the Baltic Heights, where few other crops are possible. Oats is the cereal next in importance to rye, being cultivated all over the plain. Wheat is, however, cultivated wherever the soil is rich enough. The chief areas of wheat growing in the plain are :—

(1) Round the mouth of the Elbe.

(2) In Hanover, just north of the Harz Mountains.

(3) In Silesia, around Breslau.

Sugar beet is another important crop of north Germany. The chief areas of cultivation are :—

(1) Between the middle courses of the Elbe and the Weser, particularly around the city of Magdeburg.

(2) In Mecklenburg, between the mouths of the Elbe and the Oder.

(3) In Silesia, around Breslau.

Potatoes are grown everywhere throughout the German plain. Where the soil is fertile, however, they tend to be displaced by the more valuable crops, such as wheat and beet. They are, therefore, of most importance, relative to the value of other crops, in the less fertile districts east of the river Elbe.

Barley is extensively cultivated only in Mecklenburg.

Flax is an important crop in East Prussia.

5.—**Minerals.** The only important mining regions in the German plain are :—

(1) In Westphalia, round Osnabrück and Bielefeld. Here coal is found in the plain, and iron in the Teutoburger Ridge, which is shown on the map, though not named, between Osnabrück and Bielefeld.

(2) East of Magdeburg, where there are important salt deposits.

(3) In southern Silesia, in the upper course of the Oder, near the boundary between German Poland and Czecho-Slovakia. The region about this common boundary point is the richest coal and zinc mining district of Central Europe Since the War, however, most of it has been lost to Germany, the region now being divided mainly between Poland and Czecho-Slovakia.

In consequence of this lack of minerals the industries of the German plain are almost entirely confined to the cities. They will, therefore, be dealt with in connection with these.

6.—**The Routes, Towns, and Industries of the German Plain.** *Berlin* occupies an essentially central position. It grew

up originally as the central point of a number of small states. Then it gained in importance by being on the east to west glacial valley (see above, under the heading of "Rivers") connecting the Elbe with the Oder. Later, its position in the centre of the whole empire made it the natural capital. The following railway routes, radiating from Berlin like the spokes of a wheel from the hub, should be carefully noted on the map, and then drawn on a sketch map :—

(1) North-westward by the valley of the Elbe to Hamburg.

(2) Westward through Hanover, Cologne, and Aix-la-Chapelle to Brussels and Paris.

(3) Westward through Magdeburg to join the route Number 2 at Barmen.

(4) South-westward through Halle, Nürnberg, and Munich to Italy.

(5) Southward through Dresden, Prague, and Brünn to Vienna.

(6) South-eastward through Frankfurt-on-Oder to Breslau.

(7) Eastward through Frankfurt, Posen, Lodz, and Warsaw to Moscow.

(8) North-eastward through Landsberg and Thorn to Leningrad.

(9) Down the valley of the Oder to Stettin.

(10) Northward to Rostock on the Baltic coast

The above study will not only serve as a summary of the principal railway routes of Germany, but will also emphasise the central position of Berlin. Practically all parts of the German Empire are within twelve hours' train journey of the capital.

Berlin is also an important manufacturing city. The chief branches of industry engaged in are : the manufacture of clothing, furniture, chemicals, machinery, and scientific instruments.

Magdeburg, at a crossing-place of the Elbe, is the centre of a rich beet-growing area, and has large sugar refineries.

Breslau is the trading centre of Silesia and has manufactures of woollen, iron, and steel goods. Other industrial centres in the same region are Gorlitz and Leignitz, both of which manufacture woollen and linen goods.

Hanover controls the route from Berlin to the west, and is an important market town. It has manufactures of woollen goods, machinery, and earthenware.

Munster is the capital of Westphalia. It is an important brewing centre.

Bielefeld has iron manufactures based on the local supplies of iron and coal.

ound it, which has an
7.—*The German Ports* is drained on the eastern
Hamburg is the chief Van Diemen, and Mitchell
lowest crossing-place, and ghlands. On the western
It is almost equidistant *f importance.*
consequently serves bo re and west of Australia is
raw cotton, raw wool, where over 600 feet in height,
It exports iron and 200 feet. The MacDonnell range
It is also an importa he centre of the continent, and
yards, flour mills gustus on the western side, mark the
Altona is Biteau. In the south and south-west
Cuxhav ly down to the sea, leaving little coastal
Brem orth-west there is a considerable stretch of
is about the rivers Murchison, Gascoyne, Ashburton,
unab toria.
Bre is marked by few indentations except in the extreme
th where King's Sound, Cambridge Gulf, etc., approxi-
hat to the fiord type.
kes, e.g. Amadeus and Barlee, are salt, having no outlet

Climate. Australia approaches at Cape York to within ees of the Equator, and the tropic of Capricorn passes through the middle of the island. Consequently the e is characterised by great heat; in January (i.e. in summer southern hemisphere) the interior has average temperature early 90° F., while even Victoria has an average of 72° F. uly (i.e. winter) the extreme north is still hot, having average peratures of over 72° F., and only Victoria and Tasmania can aid to have a cool climate even in winter

The same contrasts between the coasts and the interior are id here as in all land masses; Alice Springs in the centre ing a range of 30° F., while Brisbane on the east coast has only F. The annual rainfall map (see Atlas, page 4) shows that a *part of the centre and west of Australia suffers from perpetual* ght, the rainfall being less than 10 inches per year. The ll is greatest on the eastern, north-eastern, and south-eastern s, and in Tasmania.

The seasonal rainfall map (see Fig. 59) shows the following atic divisions:—

(*a*) North of about 20° N. there is heavy rain in summer, drought in winter. The summer rain is due to the fact that sun is vertically overhead near the tropic of Capricorn; this ses the winds to be drawn in from the Indian Ocean, whereas winter they blow from the land towards the north-west. The nate is, therefore, of the monsoon type.

7.—The German Ports.

Hamburg is the chief port of Germany. It grew up at the lowest crossing-place, and at the head of navigation of the Elbe. It is almost equidistant from Berlin and the Ruhr basin, and consequently serves both areas. Its chief imports are coal, raw cotton, raw wool, timber, wheat, and various foodstuffs. It exports iron and steel goods, textiles, sugar, and chemicals. It is also an important industrial centre, having great shipbuilding yards, flour mills, and soap factories.

Altona is practically a suburb of Hamburg.

Cuxhaven, near the open sea, is the outport for Hamburg.

Bremen, on the Weser, is the second port of Germany, but is about thirty miles from the mouth. Large ships are, therefore, unable to reach it, but have to stop at the outport of Bremerhaven. Bremen is connected by river and canal, as well as by railways, to the Ruhr basin, and has therefore an important share of the trade of that district.

The chief imports are cotton, tobacco, and rice. It manufactures cotton, tobacco, and chemicals.

Emden, situated at the mouth of the Ems, is a decayed port, which has recovered some of its earlier importance since the Ems was connected by canal to the Lippe, and so put into water communication with the Ruhr industrial region.

Kiel is the port near the eastern entrance to the Kiel Canal. It exports considerable quantities of butter.

Lubeck, on the little river Trave, is connected to the Elbe by canal. It thus has some small share in the trade of industrial Germany. The volume of its commerce is, however, relatively small, being chiefly concerned with the Baltic countries. Butter is an important export.

Stettin, at the mouth of the Oder, has retained a considerable share of German trade by the establishment of an outport at Swinemünde. It is the nearest port to Berlin, which fact probably accounts very largely for its being the third port in Germany. It has shipbuilding yards, breweries, and sugar refineries.

Rostock is the port of the fertile district of Mecklenburg. It is conveniently placed for a packet station, being on the shortest line between Berlin and Copenhagen. Shipbuilding is an important industry of the port.

Königsberg, situated where the river Pregel flows into the Frisches Haff, is the port for East Prussia. Its imports are chiefly coal and wood.

Danzig, at the mouth of the Vistula, is a free port, which serves both Prussia and Poland.

Chapter XIV

CENTRAL EUROPE AND THE DANUBE BASIN

(See Figure 48)

1.—**General Physical and Climatic Features.** The countries which may be considered as composing the region rather indefinitely termed Central Europe are :—

Czecho - Slovakia, Austria, Hungary, Jugo-Slavia, and Rumania.

The river Danube, although it rises in Germany, is central, and the physical features of the area should be built up about this as a centre line.

2.—**Relief.** (1) In the extreme north of the region, placed almost in the mathematical centre of Europe, is the plateau region of Bohemia, which forms the richer half of Czecho-Slovakia. This lozenge-shaped plateau is a block of old land which was left upstanding when, ages ago, the surrounding lands sunk to a lower level. Each edge of the plateau is marked by a line of mountains, viz. :—

(*a*) On the north-western edge, the Erzgebirge or Ore Mountains, forming the boundary between Czecho-Slovakia and Saxony.

(*b*) On the south-western edge the Bohemian Forest (Böhmer Wald), forming the boundary between Czecho-Slovakia and Bavaria.

Where the above ranges meet, at the north-western angle of Bohemia, is the mountain mass known as the Fichtelgebirge.

(*c*) On the north-eastern side the Giant Mountains and the Sudetes mark the boundary between Czecho-Slovakia and the Silesian province of Germany.

(*d*) On the south-eastern side the Moravian Heights, a much lower range than the three just mentioned, divides the two Czecho-Slovakian provinces of Bohemia and Moravia.

(2) On the south side of the Danube, in the Austrian provinces of Styria and Carinthia, the Alps form the highland boundary of the region. The mountains are not so high in this region as in Switzerland, and are divided up into numerous parallel west to east ranges, separated by long longitudinal valleys.

(3) The Adriatic coastal belt is occupied by the Illyrian Alps,

Eger. These two last-named streams flow respectively from the south-eastern and north-western angles of the plateau.

From the northern side of the Carpathians the rivers Oder and Vistula flow northward to the Baltic, and the Dniester southward to the Black Sea. All the other important rivers of the region lie within the Danube basin.

The Danube.—This is the most important highway of Central Europe. It rises on the eastern edge of the Black Forest, flows first north-eastward, then south-eastward across the Bavarian plateau of south Germany, receiving the tributaries Isar and Inn from the Alps and the Naab from the Fichtel Mountains. It enters Austria by a deep gorge at Passau, and between here and Vienna its valley forms an important gateway into Austria, known as the Vienna Gate. At Pressburg it receives the river March on its left bank, flowing from the lowland gap known as the Moravian Gate, between the Carpathians and the Bohemian block.

Beyond Pressburg the Danube enters the Upper Hungarian plain, which is now divided between Czecho-Slovakia and Hungary. Here the fall of the river is so small that it splits up into several channels; between the two most important of these is the tract of fertile lowland known as the Schütt Island.

In this region, too, it receives the river Leitha, a right-bank tributary from the Alps. The valley of this stream forms part of an important highway which leads over the Semmering Pass into Switzerland.

Beyond Budapest the Danube turns southward, flowing across the Great Hungarian plain. Here it receives the Drave and the Save on the right bank, and the Theiss on the left bank.

Below Belgrade, at the confluence of the Danube and the Drave, the river Morava enters the Danube from the south, its valley forming part of the great Orient Express route to Constantinople. The Iron Gates at Orsova formerly formed an almost impassable obstacle to navigation; the channel has, however, been deepened, and steamers can now reach Belgrade, while small craft can ascend the river as far as Ulm.

It is worthy of note that in the lower course of the river all the main tributaries flow from the north, i.e. from the Carpathians. The effect of the mud brought down by these rapid streams, e.g. the Alt, has been to push the course of the Danube further southward, almost up to the foot of the Balkans.

Beyond Silistria the river turns northward, leaving between it and the sea the infertile region known as the Dobruja. At Galatz it turns eastward again, and after receiving the tributaries Sereth and Pruth from the eastern side of the Carpathians, enters

the sea by a marshy, unhealthy delta, of which the chief mouth is the one on which Sulina stands.

4.—Temperature. In January, almost the whole of this region is within the 32° F. isotherm. In fact, many of the rivers are blocked with ice during that month; the lower Danube is closed by ice for more than five weeks, on the average, each year, while the Sereth and Pruth, little further north, but much further east, are frozen for about four months.

The av[illegible]eczin, on the Great Hungarian [illegible] has a temperature of only 29° [illegible]dred miles further north, has much warmer winters, her January temperature averaging about 39° F. The reason is, of course, that Central Europe is far removed from the equalising effects of the oceanic winds. In fact, over most of the area the winds come, not from the west and south-west, as in north-western Europe, but from the north and north-east.

The summers within the region are everywhere hot, except where the land is high, the whole area being within the 72° F. isotherm in July. The average July temperature of Debreczin and Belgrade respectively are 71° F. and 71·5° F., i.e. about 9° F. warmer than London.

Central Europe has, therefore, an extreme climate, though the extremes are not so strongly marked as in the case of Russia and Central Asia, which are still further from the oceanic influence.

5.—Rainfall. The plains of the region have an average annual rainfall of about 25 inches. More than half of this rain falls in the summer half of the year, the wettest month being usually June. This is because the air over the land gets heated and rises, and the moisture in it condenses owing to the sudden expansion and cooling of the rising air. Moreover, the winds in summer time are drawn inward from the sea, coming from the north-west, instead of from the north-east as in winter.

The effect of elevation in causing an increased rainfall is well marked in all the mountainous region, both the Alps and the Carpathians having 40 inches to 60 inches and over.

ECONOMIC AND POLITICAL GEOGRAPHY OF THE STATES

(i) Czecho-Slovakia.

This post-war State is most conveniently described under the headings of the three natural regions into which it is easily divisible, viz.: (1) Bohemia; (2) Moravia; (3) the Carpathian provinces of Slovakia and Ruthenia.

1.—**Bohemia.**

Forests.—The higher land around the rim of the plateau is mostly forested, with the exception of the Moravian Heights in the south. Much timber is floated down the Elbe to Germany.

Farming.—The richest agricultural region is that around the upper course of the Elbe, particularly around Königgrätz. The chief crops cultivated in this region are hops, beet sugar, wheat, and potatoes.

To the west of Prague the soil is rather infertile, but has been improved by careful cultivation. Here again the chief crops are hops, wheat, and potatoes.

The southern part of Bohemia is not a rich agricultural region, the soil being infertile. The chief crops are rye and potatoes. Sheep rearing is important on the poorer lands.

Minerals.—Coal, most of it the "brown" coal known as lignite, is extensively mined near Pilsen and Prague. Iron ore is mined in the same region. Fine clay for the making of pottery is quarried near Karlsbad.

Industries and Towns.—Prague, the capital of Czecho-Slovakia, is situated at the convergence of routes down the Elbe and its tributary streams. It is, therefore, the meeting-point of routes from Berlin via Dresden and the Elbe, from Vienna, from Breslau, and from Frankfurt and the Rhine valley. It is also in the centre of a fertile agricultural lowland, and near supplies of coal and iron. Consequently it has become an important industrial centre, specialising in the manufacture of iron and steel goods, glassware, chemicals, textiles, and beer.

Pilsen, on the river Beraum, is the centre of an important coal and iron mining area, and has thus developed many manufactures, the iron and steel industry being predominant.

Karlsbad, on the river Eger, is well known for its medicinal mineral springs. It has also considerable manufactures of pottery, based on the local supplies of China clay.

Budweis is the only important town of southern Bohemia. It is situated at the crossing of routes from Prague to Venice, and from Pilsen to Vienna. Moreover, it is in the centre of one of the few very fertile areas of southern Bohemia.

2.—**Moravia.** This is the lowland region which lies across the Moravian Gate between the Bohemian block and the Carpathians. Though including parts of these relatively infertile highlands, it is chiefly composed of low land built up of alluvial soil. It is, therefore, a fertile agricultural area. The chief crops cultivated are beet, wheat, and barley, though in the sheltered valleys at the foot of the Carpathians maize and vines are also cultivated.

The mineral wealth of the region is considerable. Coal is mined in two regions, viz.: around Brünn and near the Polish boundary in the district around Teschen. (The latter town is in Poland, but the suburbs extend into Czecho-Slovakia.)

Some iron ore is also mined, but the iron and steel industries which have sprung up in Brünn and on the Polish border are now kept going by imported ore.

Textiles are also manufactured, particularly at Brünn.

3.—**The Carpathian Region.** This is not pre-eminently an agricultural region, though barley, beet, and potatoes are widely cultivated in the fertile valleys, and maize, wheat, and vines are grown on the fertile plain between the Danube and the Carpathians. The mountain slopes are forested, and timber is one of the chief sources of wealth in the region.

Minerals are abundant throughout the whole region, iron, copper, gold, silver, and lead being the chief metals worked. The best known centres are Kremnitz and Schemnitz to the north of Budapest and Pressburg.

The mining industry is, however, not yet very highly developed, and the region as a whole is rather backward.

The chief routes across the Carpathians are formed by the headwaters of opposing streams, viz :—

(*a*) The Waag tributary of the Danube opens a valley northward into the heart of the Beskid Mountains; this is continued by the famous Jablunka Pass, which leads down to the Oder.

(*b*) The headwaters of the Waag approach near to those of the Donajec, a tributary of the Vistula, and form an important highway leading to Prezmyšl and Lemberg.

(*c*) The headwaters of the Theiss and the Dniester form an important cross-route occupied by the railway from Budapest to Lemberg.

(*d*) The Waag, with the Hernad (a tributary of the Theiss), forms an important longitudinal route running from west to east through the heart of the Carpathians.

(ii) AUSTRIA.

Post-war Austria is a comparatively small inland country, occupied by a German-speaking people. It is composed of two distinct physical divisions:—

(1) The mountainous provinces of Styria, Carinthia, etc., which form the eastern extension of the Alps.

(2) The Vienna Plain.

1.—**The Alpine Portion.** On account of the great extent of the mountains, this region is relatively sparsely populated.

Farming is confined to the fertile valleys which run mainly from west to east, between broad ranges of mountains. Wheat, maize, vine, and silk are cultivated in these valleys. There is a considerable dairy-farming industry on the lower mountain slopes. Valuable mineral deposits occur in this region. The chief mining centres are :—

Salzburg, near the river Inn, where salt is mined.

Eisenerz and Graz, where iron is mined and smelted.

Bleiberg, in Carinthia, where lead is found.

(The student will more easily remember these names if he notes that *eisenerz* is German for iron, *blei* for lead, and *salz* for salt.)

The chief route of this area, namely, the longitudinal line down the valleys of the Inn and the Enns, and thence over the Semmering Pass to the valley of the Leitha, and so to Vienna, has already been mentioned.

2.—**The Vienna Plain.** The chief interest in this section centres round the city of Vienna itself. It is admirably placed for a great capital city, being at the junction of some of the most important cross-roads of Europe, viz. :—

(1) From Berlin, via Prague, thence via both Budweis and Brünn.

(2) From the Rhine valley, via Ratisbon and the Danube.

(3) From Constantinople and Salonica, via the Danube, Budapest, and Pressburg.

(4) From Switzerland and Italy, via the Semmering Pass.

(5) From Moscow, Warsaw, and Cracow, via the Moravian Gate.

The surrounding plain is fertile, but quite incapable of supporting the dense population which had gathered in the pre-war Vienna. Before the War the city had great manufactures of cotton goods, woollen goods, iron, steel, flour, etc. Much of the raw material for these industries was derived from outlying parts of the Austrian Empire. Now that these districts form part of other countries, the industries of Vienna have collapsed and her people have had to face starvation.

(iii) HUNGARY.

This Republic is much better equipped than Austria for facing post-war conditions. It is composed almost entirely of the Upper and Lower Hungarian plains; these are natural grasslands, which are known as pustas, and have always been the home of large herds of cattle and horses. In modern times much of the land has been devoted to the growth of maize and wheat, and Hungary has, normally, a considerable surplus for export.

In addition, vines, sugar beet, and tobacco are widely cultivated.

Budapest, the capital, is a twin city; Buda occupying the left bank, and Pest the right bank. The city grew up where high land approached the river on [illegible] of the stream. Consequently [illegible] upon it from the surroundi[illegible] note the following:—

(*a*) From Vienna.

(*b*) From Belgrade, which is the junction of routes from Constantinople and from the Black Sea, via the Iron Gates of the Danube.

(*c*) Via the Semmering Pass to Switzerland.

(*d*) Northward, via the Waag and the Jablunka Pass.

(*e*) North-eastward, via *Tokay* and across the Carpathians to *Lemberg*.

(*f*) Eastward, to Grosswardein, thence through Transylvania to Bucharest.

(*g*) South of the Lake Balaton to *Fiume*.

Tokay on the river Theiss is the centre of a rich vine-growing region, and has given its name to a type of wine.

Debreczin, in the middle of the plain of northern Hungary, is a great horse market.

Fünfkirchen, to the west of the Danube, near the southern border, is the centre of a coal-mining area. Practically no other minerals are found in Hungary.

(iv) JUGO-SLAVIA.

This country, which is also known as the State of the Serbs, Croats and Slovenes, is composed of the pre-war States of Serbia and Montenegro, with the additions of certain portions of the former Austro-Hungarian Empire, viz.: Carniola, Croatia, Slavonia, Bosnia, Herzegovina, and Dalmatia.

As will be seen from the physical map, the greater part of this region is mountainous, the only lowland areas being those of Croatia and Slavonia in the north.

The chief rivers are: (*a*) the Drave, which for a part of its course forms the northern boundary; (*b*) the Save, which flows close to the northern edge of the mountainous region, and joins the Danube at Belgrade; (*c*) the Morava, which flows northward to join the Danube below Belgrade. This last-named river, with its headwaters the "Bulgarian" Morava and the Nishava, form the most important routes through Serbia.

From the point of view of economic geography the region

may be divided into (*a*) the northern lowland, and (*b*) the southern and eastern mountains.

(*a*) The northern lowland, between the valleys of the Drave, Save, and Theiss, reproduces the economic characteristics of the Hungarian plain, of which it is, physically, a continuation. It is, therefore, a pastoral and agricultural region; sheep, cattle, and goats are kept, while wheat, maize, vines, and tobacco are the chief crops cultivated.

(*b*) The southern and eastern region is a mountainous, relatively infertile, and sparsely populated region.

The coastal region of Dalmatia, known as the Karst, is composed of parallel ranges of limestone hills, which are dry and riverless; the streams flow underground, and often reappear out in the Adriatic as springs of fresh water bubbling up through the salt water. Cultivation is possible only in particularly favoured valleys, where the wearing away of the limestone has left a residue of fertile soil. Here vines and olives are cultivated. The chief occupation of the people is, therefore, the tending of flocks of sheep and goats. Fishing is important on the coast.

In the sheltered and more fertile valleys of Bosnia, Montenegro, and Serbia, wheat, vines, maize, olive, and silk can be cultivated. Bosnia is particularly famous for plums.

Belgrade, the capital of the State, occupies a commanding position, controlling the route from Vienna to Constantinople, via the Danube and the Morava.

Nish is at the junction of the two important routes of the Balkans: (*a*) From Constantinople, via the Maritza valley, and thence by Sofia and down the Nishava to Nish; (*b*) From Salonica, via the river Vardar, and down the "Bulgarian" Morava to Nish.

Sarajevo controls the route from Budapest, up the Bosna tributary of the Save, to the naval harbours of Ragusa and Cattaro on the Adriatic coast.

Fiume, an independent city at the northern end of the Quarnero Gulf, is the natural outlet for the produce of Austria and the northern part of Jugo-Slavia. It is, therefore, an important port.

(v) Rumania.

Physical Divisions. Rumania may be divided into four sections from the point of view of physical features, viz.:—

(*a*) Transylvania, which is composed of the Transylvanian Alps, the Transylvanian plateau, the Bihar Mountains, and a small portion of the plain of Hungary.

(*b*) Bessarabia, the plain between the Carpathians and the

Dniester, which river forms the boundary between Russia and Rumania. With this plain may be included the region of Moldavia between the Carpathians and the river Pruth.

(*c*) Walachia, the plain between the Transylvanian Alps and the Danube.

(*d*) The Dobruja, between the lower Danube and the Black Sea coast.

ECONOMIC GEOGRAPHY

1.—**Agriculture** is the chief industry of the people. Wheat is widely cultivated, and large quantities are usually available for export. Other crops are maize, which forms the chief food of the people; vine, the wine from which is drunk by the peasants; tobacco and fruit

2.—**Pastoral Farming** is widespread, particularly on the foothills of the Carpathians. Here the sheep are driven from the lowlands to the mountains in summer, and back to the lowlands in winter. The sheep are, however, of poor quality. The chief beast of burden is not the horse, but the ox.

3.—**Mining.** Petroleum is one of the chief products of Rumania. The most important centres are Ploesci, to the north of Bucharest, and Sinaia in Moldavia.

Iron mining, smelting, and manufacturing are carried on at Temesvár in western Transylvania.

Other minerals obtained in Rumania are gold, salt, lignite, and copper.

4.—**Timber** is plentiful on the mountain slopes It is floated down the rivers Sereth, Pruth, etc., to the Danube.

5.—**Communications and Towns.** Bucharest is the centre of the routes of Rumania. The following lines should be carefully noted on the map:—

(*a*) *From Orsova, at the Iron Gates, along the southern foot* of the Transylvanian Alps (note that the main line of railway does not follow the Danube in its lower course), through Bucharest to Constantza, a port on the Black Sea.

(*b*) From Varna on the Black Sea coast of Bulgaria, through Bucharest, northward through Ploesci, and thence through Moldavia to Lemberg and Warsaw.

(*c*) From Bucharest, up the valley of the river Alt, then by the Red Tower Pass, and down the valley of the Maros to the Great Hungarian plain.

Galatz and *Braila are the two great ports of the Danube,* situated above the delta. They are chiefly engaged in the export of wheat and maize. Their harbours are, however, closed for about *forty days in the year.*

Galatz has also many sawmills, which use the timber brought down the river Sereth, while Braila manufactures woollen goods and cotton goods.

Constantza, on the Black Sea, is important as the terminus of the most important railway of Rumania. It is also ice-free, thus having a great advantage over Braila and Galatz. It is the chief oil port of Rumania.

Chapter XV

EASTERN EUROPE

I.—Poland

THIS Republic, formed after the Great War out of the Russian province of Poland and the Austrian province of Galicia, together with a portion of German Silesia in the south and a "corridor" between East and West Prussia, has characteristics transitional between Central and Eastern Europe.

1.—**Physical Features.** With the exception of the southern half of Galicia, which rises to the [illegible] the Carpathians, the whole of Poland ma[illegible] [illegible]id to form part of the great European [illegible] may, however, be distinguished. They are :—

(1) The Carpathians in the south.

(2) The plateau region between the towns of Lodz, Cracow, and Lemberg.

(3) The northern plain, around Posen, Bromberg, and Warsaw.

(4) The Pripet Marshes, between Brest Litovsk and the Russian boundary.

(5) The marshy district on the borders of East Prussia in the north

The chief river is the Vistula, with its tributaries the San and the Bug The Warthe, a tributary of the Oder, forms, along with the Bug, an important west to east highway leading from Berlin through Warsaw towards Leningrad

In the east the Pripet, with its tributary the Horyn, drains the Pripet Marshes, while in the south the Dniester cuts a deep valley in the plateau east of the Carpathians.

2.—**Climate.** This is transitional between the equable climate of western Europe and the extreme climate of Russia. Posen, near the western frontier, has a January temperature of 29° F., and a July temperature of 65·5° F, giving a range of 36·5° F. Warsaw has January and July averages of 26° F. and 66° F., giving a range of 40° F. These temperatures should be compared with those given in the earlier sections on western Europe, and with the following figures for Moscow: January, 12° F.; July, 66° F.; range, 54° F. It will thus be clearly seen that the winter tem-

peratures become much lower, the summer temperatures rather higher, and the range of temperature much greater as we go further into the interior of the Continent.

The rivers in Poland are usually frozen for about four months of the year, from December to March.

The rainfall of the Polish plains averages between 20 and 25 inches per year. As more than half of this falls during the summer half of the year, and as much of the winter rain is in the form of snow, which provides abundant water at the spring thaws, there is everywhere in the country sufficient moisture for the cultivation of crops.

ECONOMIC GEOGRAPHY

1.—**Timber.** Although most of the plain has been cleared there still remain, in the middle of the country, many valuable pine forests. On the slopes of the Carpathians are dense forests of oak, ash, and birch.

2.—**Arable Farming.** Nearly half the surface of Poland is under the plough. The richest agricultural districts are around Warsaw, between the Vistula and the western boundary, and in the fertile valleys of the Carpathian foothills.

The chief crops cultivated are wheat, rye, oats, barley, sugar beet, flax, hemp, and maize. The only really infertile portions are the marshy lands near the eastern and northern boundaries.

3.—**Minerals.** Poland is rich in minerals, the two principal mining areas being the Teschen-Cracow district and Galicia.

In the former region Poland has the greater part of the coalfield which lies near the border between the countries of Poland, Germany, and Czecho-Slovakia. In this region many metallic ores, notably zinc, iron, silver, and lead, are also mined.

In Galicia the chief minerals are petroleum and salt, the towns most noted for these being Bitkow for petroleum and Wieliczka for salt.

4.—**Routes, Towns and Industries.**

Warsaw, the capital of Poland, is built on an eminence overlooking the river Vistula; being beyond the reach of floods, it thus became important early in the history of the country. It is, moreover, at the natural crossing-place of the south-to-north river route via the Vistula, and the west-to-east land route formed by the rivers Warthe and Bug. From it railways radiate to Danzig, Leningrad, Moscow, Budapest, Vienna, and Breslau. It is an important industrial centre, manufacturing hardware, sugar, textiles, boots and shoes. It has also great distilleries,

which extract spirit from the potatoes grown in the surrounding district.

Lodz is an important fortress town on the main line between Berlin and Warsaw. It specialises in the manufacture of cotton goods.

Cracow is an ancient city situated at the head of navigation of the Vistula. It controls the routes from Breslau to Odessa, along the north-eastern edge of the Sudetes and the Carpathians, and from Warsaw to Vienna via the Moravian Gate. It is at the edge of the mining and manufacturing region of the south-west, in which the most important towns are Beuthen, Königshütte, and Teschen.

Lemberg is situated on the high land between the rivers Dniester and Bug. The physical map shows how the routes in this region, keeping on the plateau and away from the deeply-cut marshy valleys, converge on Lemberg.

Danzig, with the delta of the Vistula, forms a free city, under international control. It is the natural outlet for the trade of Poland, and forms its chief port, but the Polish government are *constructing a new port a little distance to the west. This port* will be entirely within the control of Poland.

II.--Russia

1.—**Physical Features.** Russia *spans the Continent of* Europe at its widest part. It *fronts on four seas, viz, the White Sea and the Arctic Ocean in the north, the Gulf of Finland in the* west, and the Caspian and Black Seas in the south. In spite of this, Russia cannot be said to be a maritime country The proportion of coast to area is very low. All her seas except the Black Sea are ice-bound in winter, and even this sea freezes at the edges; the Caspian is an enclosed sea; the White Sea is remote from great trade routes; the exits from the Gulf of Finland and the Black Sea are in *the hands of other Powers*

The characteristic of the surface of the land is monotony. With the exception of the Ural Mountains and the Caucasus, which form approximately the boundaries on the east and south, the land does not rise over 1000 feet above sea-level. The only large areas which rise above the 600 feet level are the Volga Heights and the Valdai Hills with their southward extensions. Even these heights, however, *are hardly noticeable* in the actual topography, as they are approached by such gradual slopes.

The hydrographical centre is the Valdai Hills. From this region flow the Lovat to Lake Ladoga, the Dvina to the Gulf of Riga, the Dnieper to the Black Sea, the Volga and its tributary the Oka to the Caspian Sea.

To the Arctic Ocean drain the rivers Onega, northern Dvina, and Petchora.

The Don, with its tributary the Donetz, drains to the Sea of Azov; the Dniester forms the western boundary between the Ukraine district of Russia and Bessarabia in Rumania; the Ural forms for a short distance the boundary between Asia and Europe.

Around the Caspian Sea the land is a salt marsh, below sea level. It represents the former bed of the Caspian Sea. Leading from the Caspian Sea to the Sea of Azov is the Manytch depression, a low trough only a few feet above sea level. It is drained by the river of the same name.

2.—**Climate.** The broad outlines of the climate of Russia were given in the introductory pages of the section on Europe. The student should first refer to these, then consider the following statistics, noting the way in which they add definiteness to the statements already made:—

Archangel has a January temperature of 7° F., a July temperature of 60° F., a range of 53° F., and an annual rainfall of 15 inches, most of which falls in summer.

Leningrad has a January temperature of 15° F., a July temperature of 64° F., a range of 49° F., and a rainfall of 19 inches, most of which falls in summer.

Moscow has a January temperature of 12° F., a July temperature of 66° F., a range of 56° F., and an annual rainfall of 21 inches, summer rain being again predominant.

Astrakhan has a January temperature of 19° F., a July temperature of 78° F., a range of 59° F., and an annual rainfall of only 6 inches, of which slightly more falls in summer than in winter.

Orenburg ranges from 3·5° F. in January to 71° F. in July, a difference of 67·5° F.; its rainfall is only 15 inches, of which 2 inches fall in June.

The student should find these places on the map, and from the above facts check the following statements:—

(*a*) Winter temperatures decrease rapidly from west to east; the decrease from south to north being very gradual—Archangel is only 12 degrees colder in January than Astrakhan.

(*b*) Summer temperatures are everywhere fairly high, even Archangel having summers as hot as those of London. The temperature-increase is most noticeable in a south-easterly direction.

(*c*) Rainfall is everywhere rather low, decreasing towards both north and south from a maximum about Leningrad. The south-east is very dry, having insufficient rainfall for agriculture.

3.—**Vegetation.** There are five belts of vegetation to be observed in Russia. These are:—

(1) The Tundra, in the extreme north.

(2) The coniferous forest area which advances further south towards the interior of the country.

(3) The deciduous forest area which thins out to the east, disappearing before it reaches the Volga.

(4) *The Black Earth* region which, though very fertile in western and central Russia, becomes less fertile as it approaches the Black Sea and the Caspian.

(5) The Salt Steppes around the Caspian Sea.

These vegetation belts form the natural divisions of Russia. *It will be noted that Russia is the only European country in which* the natural divisions are not based upon the relief of the land.

ECONOMIC GEOGRAPHY

1.—**The Tundra.** *Here the long, cold winters do not permit* cultivation of the ground. The people are, therefore, engaged only in fishing and in the herding of reindeer.

Archangel is the port of the region; it is frozen for seven months in the year.

2.—**The Northern Forests.** *Here the chief industries are* lumbering, hunting, and the preparation of resin, tar, and pulp from the pine woods. In the clearings are farms where rye and oats are cultivated.

3.—**The Deciduous Forest Area.** This is more extensively cleared than the coniferous forest region. The chief crops cultivated are wheat, rye, oats, and flax. Within this region are some of the chief towns of Russia.—

Leningrad was built by Peter the Great in the early part of the eighteenth century. (It was then known as St. Petersburg; during the Great War its name was changed to Petrograd, and, after the Russian Revolution, to Leningrad.) The city is built on the Neva Bay at the head of the Gulf of Finland and at the mouth of the river Neva, which flows from Lake Ladoga. A ship canal connects the city with the naval station of Kronstadt, situated on an island at the head of the navigable portion of the Gulf of Finland. Though Leningrad is not now the capital of Russia, having given place to Moscow, it is still of considerable importance, both as a port and as a manufacturing city. It exports timber, and imports raw cotton

Moscow early became important, as it is in the centre of the rivers which have always *formed the natural routes of Russia. In* modern times it has become the centre of the railway system of Russia, railways diverging from it to Warsaw, Leningrad, Archangel, Samara, and thence across Siberia, Astrakhan, Rostov at the head of the Sea of Azov, Odessa on the Black Sea, Kiev, and Vienna

Moscow is also the most important industrial centre in Russia. Coal is found a little to the south at Tula. Iron ore is also found in the same region. Consequently before the Revolution this region had become the centre of great manufactures of cotton goods, iron and steel goods, and hardware. The chief towns of the region, in addition to Moscow and Tula, are Vladimir, Smolensk, and Kostroma.

Nijni-Novgorod is situated at the confluence of the Oka and the Volga. It has, therefore, always been the meeting-point of two great streams of traffic. An annual fair is still held there, to which come merchants from all parts of Asia to buy and sell their produce.

Perm, in the Urals, is the chief centre in the world for the mining of platinum.

4.—**The Black Earth Region.** The soil with which this region is covered had its origin in the mud which was laid down by the glaciers which extended over northern and central Europe during the Ice Age. Much of this mud was washed southward by great rivers which were formed from the melting ice, and the sediment deposited on the region now known as the Black Earth.

The rainfall of this region is not much less than that of the deciduous forests further north, but the higher summer temperatures, combined with the looseness of the surface soil, make the growth of forests impossible. Hence this region is a great natural grass-land, which thins out to the south and south-east.

While on the poorer Steppes to the east of the Volga the grass-lands are still given up to the pasturage of large herds of cattle and flocks of sheep, in the Black Earth region of Russia, particularly in the Ukraine, the ground is cultivated. The fertile soil, hot sunny summers, and rather low rainfall make this region almost ideal for the growth of wheat of high quality. Other crops, cultivated in rotation with wheat, are rye, oats, barley, maize, and sugar beet.

The chief wheat ports of the region are: Odessa, a little east of the mouth of the Dniester, Kherson at the mouth of the Dnieper, and Rostov at the mouth of the Don.

Other towns of importance in the region are: Kiev, Orel, and Samara, all situated near the natural boundary between the grass-land and the forest.

The Donetz Industrial Area.—In the valley of the Donetz, a tributary of the Don, are found extensive deposits of coal, while iron is mined near Yekaterinoslav on the Dnieper, and near Kerch in the peninsula of Crimea. The chief industrial town of the region is Kharkof, which had, before the Revolution, important manufactures of iron and steel goods.

5.—**The Salt Steppes.** This region is almost absolute desert, and is therefore of little economic importance.

Orenburg, *on the river Ural, at the northern edge of the* region, is a market town for the products of the flocks and herds which roam about the less barren steppes under the charge of nomadic Kirgiz or Cossack herdsmen.

Astrakhan is the port at the mouth of the Volga. It is a centre of the sturgeon fishery, collects wool and tallow from the nomadic herdsmen of the Kirgiz Steppes, and imports petroleum from Baku.

6.—**The Caucasus.** Although this range of mountains forms such a formidable physical barrier, Russian influence has spread beyond it into the districts of Georgia and Azerbaijan.

The region occupied by these two States may be divided into three physical divisions :—

(*a*) The Caucasus Mountains in the north.

(*b*) The edge of the Armenian plateau in the south.

(*c*) Between these a long narrow depression reaching from the Black Sea to the Caspian, and drained by the River Kara flowing to the Caspian Sea.

The chief economic product of this region is petroleum, which is obtained from wells in the Baku district on the Apsheron peninsula and carried by pipe-line to the port of Batum on the Black Sea, or shipped to Astrakhan at the mouth of the Volga.

III.—The Baltic States

The Baltic States of *Finland, Esthonia, Latvia and Lithuania* were formerly part of the Russian Empire. Their peoples, however, belong to races quite different from the Russians, and, after the Great War, they demanded their independence

1.—**Finland**, the most northerly of these States, is a lake-studded lowland, composed of very ancient rocks which had been worn down by the weathering agents acting continuously through *probably hundreds of millions* of years, to form an undulating surface which is called a peneplain (*pene* almost)

The lakes, of which there are many thousands, are the result of the last great Ice Age ; at this period the glaciers scooped out hollows in the rock surface, and on melting left an irregular deposit of moraine over the surface of the country The lakes now occupy these rock basins and the hollows in the surface moraine.

The surface of Finland is largely covered with coniferous forest, though there are extensive clearings devoted to grazing and agriculture. The chief products are timber, wood pulp,

resin, turpentine, and some dairy produce. Some iron is mined, and as water power is abundant Finland may eventually develop some industries.

Helsingfors, the capital, situated on the Gulf of Finland, is the most important port, sending out timber, wood pulp, and dairy products, the greater part of which come to Britain.

Tammerfors is the chief manufacturing town. Here cotton, linen, and woollen goods, as well as paper, are manufactured. Waterfalls provide the necessary power.

Abo is the second port of importance, and is also the centre of educational activity in modern Finland.

2.—**Esthonia.** The people of Esthonia are closely allied both by race and language to the Finns. The surface of the States, though covered with glacial deposits, is not lake-studded like Finland. The forests, too, are not so dense, and the proportion of cultivable land is higher. The chief cereals cultivated are rye and oats, while flax and potatoes are also grown. There is a considerable dairy-farming industry.

Revel is the only important town. Being situated on the coast of the Baltic, rather than in the enclosed Gulf of Finland, it does not suffer so much as Leningrad from the freezing of its harbour in winter; in fact it is open almost throughout the winter. Its exports are timber and timber products, butter and eggs, flax and linseed.

3.—**Latvia and Lithuania.** The people of these States belong to a race quite distinct from those inhabiting the surrounding countries.

The surface of the two States is very similar, being natural forest land, with large clearings in which grazing and agriculture are carried on.

Riga, the capital of Latvia, was formerly the third port of Russia, ranking after Leningrad and Odessa. It exports timber and timber products, flax, linseed, butter, and eggs. It also manufactures paper and textiles. Its harbour, being situated at the head of the semi-enclosed Gulf of Riga, is ice-bound for several months each year.

Libau, situated on the open coast of the Baltic, is practically ice-free.

Windau, midway between Riga and Libau, is another ice-free port. The trade of these two ports is similar to that of Riga.

Lithuania has only a few miles of coast-line, and has no port of her own, but Memel, situated at the mouth of the Niemen, is an international port.

Chapter XVI

THE MEDITERRANEAN STATES

I.—Iberia (Spain and Portugal)

1.—**Physical Features.** The following physical divisions (see *Fig. 49) should be noted on the orographical map.*

(1) The Pyrenees, and their continuation the Cantabrians, *on the north. Note how:—*

(*a*) The Pyrenees form an almost complete physical barrier *between France and Spain, allowing only* a narrow passage at each end.

(*b*) The Cantabrians shut off the northern coast from access to the interior, and leave between them and the sea only a narrow coastal plain, crossed by no important rivers.

(c) In Galicia the mountain ridges run out to the sea forming numerous parallel peninsulas and estuaries, like those of Brittany.

(2) The Meseta or central plateau of Spain, an ancient block of hard rock, which is crossed by several east-to-west ranges, the most important being the Sierra de Guadarrama, the Serra da Estrella, the Sierra de Toledo, and the Sierra Morena.

Between these ranges the chief rivers—the Minho, Douro, Tagus, and Guadiana—have cut deep east to west gorges in the plateau.

(3) The Ebro basin, a triangular lowland situated between the Pyrenees on the north, the edge of the Meseta on the south-west, and a coastal range of mountains on the south-east

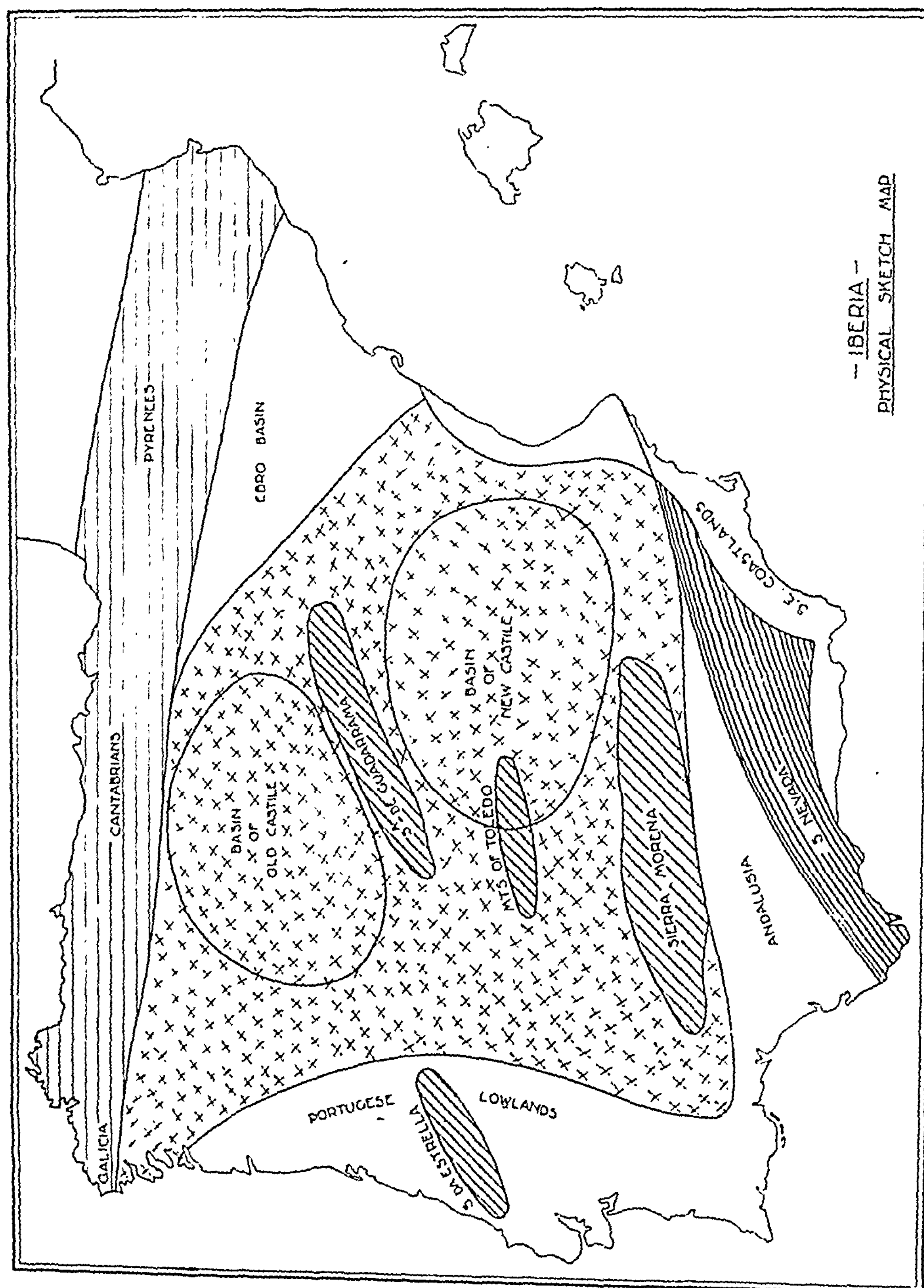
(4) The lowlands of Portugal, divided into northern and southern regions by the Serra da Estrella and its continuation in the ridge which ends in Cape da Roca

(5) The basin of the Guadalquivir, between the Sierra Morena on the north and the Sierra Nevada on the south

(6) The Sierra Nevada, in the south, running from Gibraltar to Cape de la Nao, is a range of fold mountains which continue the Atlas of northern Africa They are themselves continued by the Balearic Islands of Iviza, Majorca, and Minorca.

(7) The coast-lands of Granada, Murcia, and Valencia.

2.—**Climate.** The Iberian peninsula lies between two belts of planetary winds, viz. the Westerlies in the north and the North-


- IBERIA -
PHYSICAL SKETCH MAP
PYRENEES
EBRO BASIN
CANTABRIANS
GALICIA
BASIN OF OLD CASTILE
S. DE GUADARRAMA
BASIN OF NEW CASTILE
MTS OF TOLEDO
SIERRA MORENA
ANDALUSIA
S. NEVADA
S.E. COASTLANDS
PORTUGESE LOWLANDS
S. DA ESTRELLA

East Trades which blow over the Sahara. In summer the dividing line between these two sets of winds is approximately on latitude 42° N., the regions south of this line having winds from the north and north-east, and the regions to the north of this line having winds from the west.

In winter the dividing line between the two sets of winds is further south, about latitude 35° N. Hence most of Iberia in this season is under the Westerlies.

The following climatic regions may thus be distinguished in Iberia :—

(1) The north and north-west, i.e. Galicia, Asturias, the Cantabrian region, and the Pyrenees. Here rain is brought by the Westerlies at all seasons, and the climate is equable and moist, like that of north-western Europe.

(2) Central Spain, including the Ebro basin, being in the rain shadow of the coastal mountains, has a rather low rainfall at all seasons, and an extreme temperature. The following statistics for Madrid are typical of the whole region :—

January temperature, 40° F.
July temperature, 76° F. } Range, 36° F.

Annual rainfall, 17 inches, of which more falls in winter than in summer.

(3) The south and south-east of Spain may be said to have a Mediterranean type of climate—that is, rain in winter, with dry summers and a rather warm temperature, midway between extreme and equable. The following statistics for Seville may be taken as typical :—

January temperature, 52° F.
July temperature, 85° F. } Range, 33° F.

Annual rainfall, 18 inches, about three-quarters of this total falling in the winter half of the year.

INDUSTRIES IN IBERIA

1.—Farming.

(a) Cattle-rearing and dairy-farming are important on the mild, moist lowlands of the north in Galicia and Asturias

(b) Sheep-rearing is the typical pastoral industry of the Meseta. The Spanish merino sheep formed the basis of the great flocks which now roam the grass-lands of Australia and Argentina

(c) Wheat is cultivated mainly in the basin of Old Castile, around Valladolid.

(d) Maize is grown in the fertile valleys of Asturias.

(e) Vines are cultivated in all the valleys of Portugal and the Meseta, but are most numerous on the south-eastern coast-lands

In Portugal the most important district is that around Oporto, the home of "port" wine.

(*f*) Typical Mediterranean fruits—olives, oranges, lemons, etc.—are chiefly cultivated on the coastal region of the south-east, e.g. Seville, Valencia, Murcia, Almeria.

(*g*) Cork is one of the most important products of Portugal, which provides about one half of the world's supply.

(*h*) Other products include cane sugar, cotton, silk, and rice, which are grown on the fertile coast-lands of Granada, Murcia, and Valencia.

2.—**Mining.**

(*a*) Iron is mined in the Cantabrian region at Santander, Bilbao and Leon, in the Sierra Morena region around Huelva.

(*b*) Coal is mined at Oviedo, and shipped from the port of Gijon on the north coast.

(*c*) Copper is obtained from the famous Rio Tinto mines near Huelva.

(*d*) Other minerals include silver, lead, and zinc, all of which are mined in the Sierra Morena region, manganese at Oviedo, and zinc near Santander.

3.—**Routes, Towns, and Industries.**

Madrid, the capital of Spain, occupies a central position on the Meseta. From it routes radiate as follows :—

(*a*) North-eastward via the Henares tributary of the Tagus, then down the Jalon tributary of the Ebro to Saragossa, and thence via Barcelona round eastern end of the Pyrenees to Marseille, and round the western end of these mountains via Bayonne to Bordeaux.

(*b*) Northward, across the Sierra de Guadarrama to Valladolid, thence across the Cantabrians to the north coast at Santander and Gijon.

(*c*) Westward, following the high land at the edge of the Tagus valley to Lisbon.

(*d*) Southward, across the Sierra Morena into the upper valley of the Guadalquivir, where lines branch off to Cadiz and Almeria.

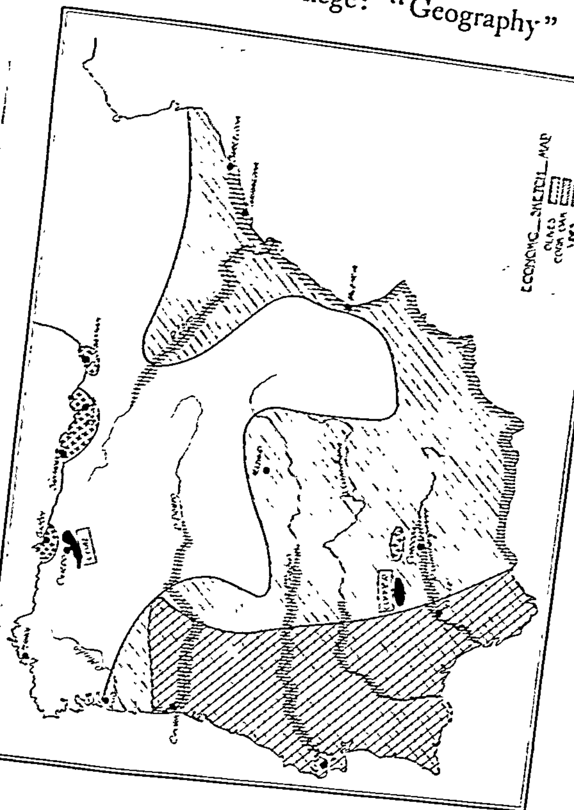
(*e*) South-eastward to Murcia and Cartagena.

Barcelona is the greatest industrial centre of Iberia. There is a small coalfield to the north of it, and cotton, woollen, linen, silk, and iron goods are manufactured.

Valladolid, in the middle of the plain of Old Castile, controls routes to France, the north coast, Madrid, and Lisbon. It is the most important flour-milling centre in Spain.

Valencia is the third Spanish city in size, ranking after Madrid and Barcelona. It is the port for the fertile "bay" of lowland between the mountains and the coast, and exports the oranges,

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raisins, and other Mediterranean products which are grown in this region.

Cartagena and *Alicante* are ports serving similar fruit-growing bays of lowland situated between projecting spurs of the Sierra Nevada.

Seville is the market and port for the rich fruit-growing region of Andalusia. Though more than fifty miles from the sea, it can be reached by small steamers. It exports oranges, copper, and iron, and manufactures iron goods.

Cadiz was formerly the port for the region of Andalusia, but has lost most of its trade since the deepening of the Guadalquivir up to Seville. It still exports the sherry from the neighbouring town of Xeres.

Oviedo, near the north coast, has already been mentioned as the chief coal-mining centre in Spain.

Gijon is the chief coal port of the region.

Bilbao and *Santander* export large quantities of iron ore to South Wales, though some is smelted before export.

Vigo, in Galicia, is a centre of the sardine fisheries.

Lisbon, the capital of Portugal, is situated at the mouth of the Tagus, at the only break in the Portuguese coast south of Oporto. It is at the meeting-place of routes down the Tagus valley, and along the coastal plains to the north and south. It is also conveniently situated for trade with South America. Its chief exports are cork, wine, and copper. It has some shipbuilding, and is the centre of the industrial life of Portugal, manufacturing woollen goods and metal goods.

Oporto, at the mouth of the fertile Douro valley, is famous for its export of port wine.

Setúbal, a little to the south of Lisbon, is engaged in the sardine industry.

II.—Italy

1.—**Physical Features.** The following physical divisions should be noted on the map :—

(1) *The Alps.*—These mountains are separated from the Apennines by the pass of the Col dell Altare, north of the Gulf of Genoa. In the region between the Col de Tenda and Lake Como, the mountains slope very steeply down to the Piedmont region (*pied*=foot, *mont*=mountain). In the Trentino district of northern Italy, much of which was gained from Austria after the Great War, the ranges broaden out, and several have a distinct north to south trend. About the river Isonzo, which flows into the northern end of the Adriatic Sea, a stretch of lower land may be said to divide the Alps from the Illyrian Alps of Jugo-Slavia.

(2) *The Apennines*, which form the "backbone" of the Italian peninsula, are composed of many parallel ridges, set obliquely behind each other, and leaving between them transverse gaps which have facilitated *communication* between northern and southern Italy. It should be noted that south of Pisa the Apennines leave [illegible] to the east, only [illegible]

(3) *The Bas* [illegible] Alps and the Apennines, was formerly a gulf of the Adriatic Sea. The sediment brought down from the mountains on either side has, during the course of ages, filled up this sea and converted it into a fertile plain. The river Po has been gradually pushed southward up to the foothills of the Apennines by the sediment which is *brought down from the Alps in greater quantities than from the* Apennines. All the important tributaries flow from the north, e.g. the Ticino which drains Lake Maggiore, the Adda which drains Lake Como, and the Mincio which drains Lake Garda. The Piave, the Tagliamento, and the Isonzo drain from the Venetian Alps to independent mouths at the northern end of the Adriatic. It is quite probable that in a few hundred thousand years they will have filled up this bay, and themselves become tributaries of an enlarged river Po.

(4) *The Western Lowlands.*—Situated between the Apennines and the western coast, these lowlands occupy the provinces of Tuscany, Umbria, Latium, and Campagna. The chief rivers of this division are the Arno in the north, the Tiber in the centre, and the Volturno in the south. All these rivers have deposited in their lower courses a great deal of alluvium, which forms, in some places, fertile arable land, and in others malarial marshy land.

In the northern district of Tuscany there is an area of hard old rock which contains marble and some metallic ores. The islands of Elba and Sardinia are composed of similar rocks. They are remnants of an old block, most of which has sunk below the level of the Tyrrhenian Sea. In the south is the volcanic region around the active volcano of Vesuvius.

(5) *The Eastern Lowlands.*—The Apennines approach close to the east coast in the north, but in the south they leave a considerable area of lowland in Apulia, round the "heel" of Italy. The rock here is chiefly limestone, like that of the Illyrian Alps.

(6) *Sicily.*—The "toe" of Italy, in the province of Calabria, continues the line of the Apennines to Cape Spartivento and the Straits of Messina. Across these straits, the mountains are continued through Sicily, and thence by a submarine ridge to Cape Bon in northern Africa.

2.—**Climate.** Southern or peninsular Italy has a typically Mediterranean climate, having its wet winters and dry hot summers. Northern or continental Italy has, however, more rain in summer than in winter. It has also a more extreme climate, having colder winters than southern Italy. The following statistics should be carefully noted as typical of the two regions :—

Milan has a January temperature of about 32·5° F., a July temperature of 75° F., a range of 42·5° F., and an annual rainfall of 40 inches, of which rather more than half falls in the summer half of the year, and only about one-sixth in the three winter months.

Naples has a January temperature of 47° F., a July temperature of 75° F., a range of 28° F., and an annual rainfall of 33 inches, of which two-thirds falls in the winter half of the year.

ECONOMIC GEOGRAPHY

1.—**Pastoral Farming.** The northern part of Italy, in the basin of the Po, is the most important dairying region of Italy. Much of the milk is made into cheese (e.g. Gorgonzola). In the south the chief cattle-rearing districts are on the marshy plains near the west coast.

Sheep are more numerous in the south than in the north, particularly on the Apennines and in the limestone district of Apulia.

2.—**Agriculture.** Wheat is cultivated in the northern region mainly for the sake of its straw, which is manufactured into straw hats at Leghorn. In the south the chief wheat-growing district is the drier regions of the east, e.g. Apulia. Here the wheat is made into macaroni, one of the chief foods of the people.

Olives are cultivated all over the lowlands in the south, but the cold winters make its cultivation impossible on the northern plain. Lucca, north of the river Arno, is famous for its olive oil.

Vines are cultivated throughout Italy, but do not thrive well on the open plains of the Po basin. The best regions are the sheltered valleys of the Alps and of the Apennines. Much wine is manufactured in southern Italy.

Silk is obtained from the silkworms which feed on the leaves of the mulberry tree. The basin of the Po is the chief region of cultivation, the dry summers of the south being unfavourable to the continuous production of leaf. Italy produces the finest silk in the world.

Flax is cultivated in the north, where it forms the basis of the linen industry. In the south linseed oil is obtained from the seeds.

Maize is widely cultivated throughout Italy, and forms one of the chief foods of the people.

Rice is grown on the irrigated lands of the Ticino valley. Although the yield is not very high, the quality is good.

Oranges are grown chiefly in the lowlands round Naples and Salerno.

3.—**Minerals.** Iron is found in small quantities in the southern valleys of the Alps (e.g. the Dora Baltea), and in the island of Elba. Lead and zinc are mined in Sardinia; mercury is obtained in the peninsula of Istria. *Carrara, north of Pisa, is* famous for its marble. Sulphur is obtained from the volcanoes of southern Italy.

Coal is *almost entirely absent, and the above mining districts* are not very productive. It will, therefore, be realised that Italy is heavily handicapped as a manufacturing nation. Water-power is, however, being increasingly used to supply the lack of coal.

4.—**Routes, Towns, and Industries.** (See Fig. 51.)

Milan is at the meeting-place of routes across the Alps via the Simplon Pass, the St. Gothard Pass, and the Splügen Pass. From it routes diverge to Turin, Venice, Genoa, and Bologna. It is an important industrial centre, having manufactures of silk, cutlery, and motor-cars.

Turin is at the meeting-place of routes across the Alps via the Mont Cenis and St. Bernard Passes. It is also at the head of river navigation of the Po, and is the centre of a fertile dairying region. It has, consequently, developed considerable manufactures of woollen goods.

Venice grew up originally as a refuge for merchants and others who were driven from their homes by the invasions of the Huns. Its position at the head of the Adriatic Sea, and at the meeting-point of the routes (*a*) over the Alps by the Brenner Pass, (*b*) from France via Turin and the valley of the Po, (*c*) from Austria via the Venetian lowlands, soon made it of great importance, and it was during the Middle Ages the chief port of exchange between Europe and the East.

Genoa is the chief port of Italy. It is the natural terminus of the route from the Rhine valley, over the St. Gothard Pass, then via Milan and Alessandria to the coast. It is indeed to the Alpine tunnels, rather than to its own immediate hinterland, that Genoa owes its great importance as a European port.

Trieste, at the head of the Adriatic, is the natural outlet of the trade of central Europe via the Semmering Pass.

Florence stands almost at the great bend of the Arno, where the south-east to north-west direction of the upper river changes to the westerly direction of the lower stream. North of Florence a tributary stream of the Arno has cut back its head near to the

headwaters of the river Reno, which flows to the Adriatic, south of the Po delta. This valley forms a convenient pass over the Apennines, which is used by the railway from the north via Bologna to Florence. Beyond this city the line passes up the valley of the Arno, then by a wide gap in which stands Lake Trasimeno, and down the Tiber valley to Rome.

Florence thus holds an important strategical and economic position where the great north to south route crosses the east to

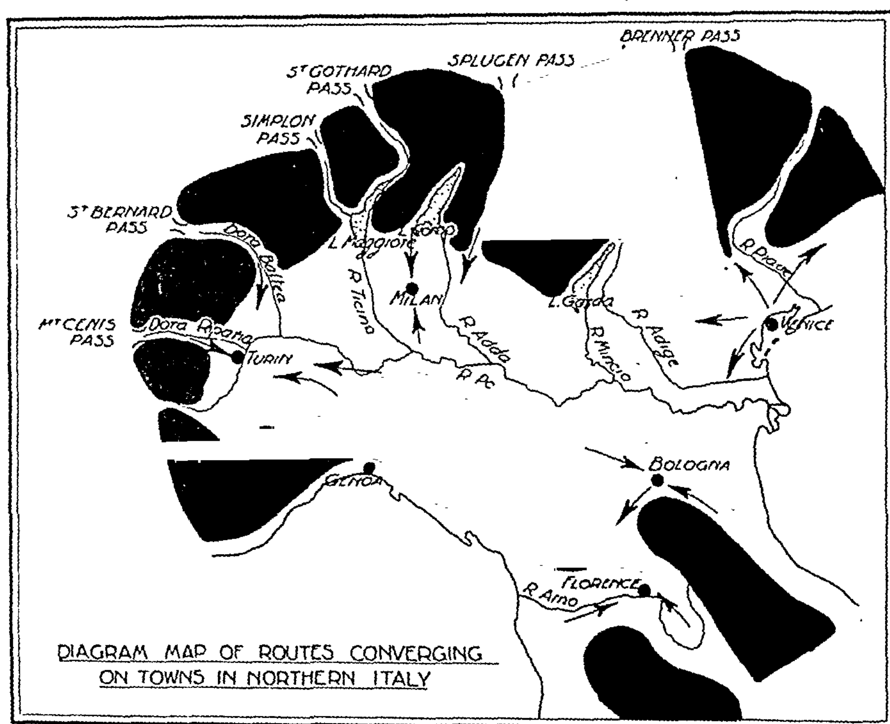


Fig. 51

west route of the Arno valley. The city is the centre of the straw-plait industry, manufactures macaroni, smelts iron ore, and exports the famous Chianti wine.

Rome, the capital of Italy, was built on seven hills, rising above the flood-plain of the river at the lowest bridge point. Its situation enabled it to control, even in early times, the whole of peninsular Italy. In modern times the railways of the peninsula converge there. Note the following routes on the map:—

(*a*) From Florence, via the headwaters of the Arno and the Tiber.

(*b*) From Genoa and Pisa, via the coastal plain of Tuscany and Latium.

(*c*) North-eastward across the Apennines to Ancona, on the east coast.

(*d*) Via Tivoli to the east coast.

(*e*) South-eastward, via the upper valley of the river Garigliano (marked, but not named, on the physical map), and then across the river Volturno to Naples.

Naples has the only good harbour on the west coast of the peninsula. It commands the route via Benevento, across the Apennines to Foggia in Apulia. It has of late years become the centre of many industrial concerns, manufacturing cotton goods, lace, machinery, motor-cars, sugar, and macaroni. The power is derived from the rapid streams.

Messina is the ferry-port which connects Sicily with the mainland at Reggio. It is the centre of an earthquake region, and the surrounding region has more than once been devastated by earth tremors. Mulberry trees are cultivated in the neighbourhood, and silk manufacture is carried on in the city.

Palermo, the capital of Sicily, stands on a fine harbour. The district around is noted for the cultivation of oranges, lemons, and grapes.

On the east coast of the peninsula the towns are not so important as on the west coast. Trace on the map the main line of railway from Milan and Turin, along the north-eastern foot of the Apennines via Piacenza, Parma, Reggio, Modena, and Bologna, and then by the eastern coastal plain via Ancona, Foggia, and Bari to Brindisi. The latter port is the terminus of the overland route from Paris, Brussels, etc. Here the trains connect with steamers which convey passengers and mails to Egypt and the East.

III.—The Balkan Peninsula

The region which is usually, though somewhat vaguely, termed the Balkans, includes the States of Bulgaria, Turkey in Europe, Greece, and Albania; the Serbian portion of Jugo-Slavia also falls within this region.

A general account of the physical features, climate, and routes of the whole region will first be given; following this the chief points in the economic geography will be dealt with under the headings of individual states.

1.—**Physical Features.** (See Fig 52) The whole region is a tangled mass of mountains which it is difficult to reduce to a simple plan. Broadly speaking, however, three mountain systems may be distinguished, viz.:—

(*a*) On the west, a series of ranges continue the line of the Illyrian Alps, through Montenegro, Albania, and Greece. The

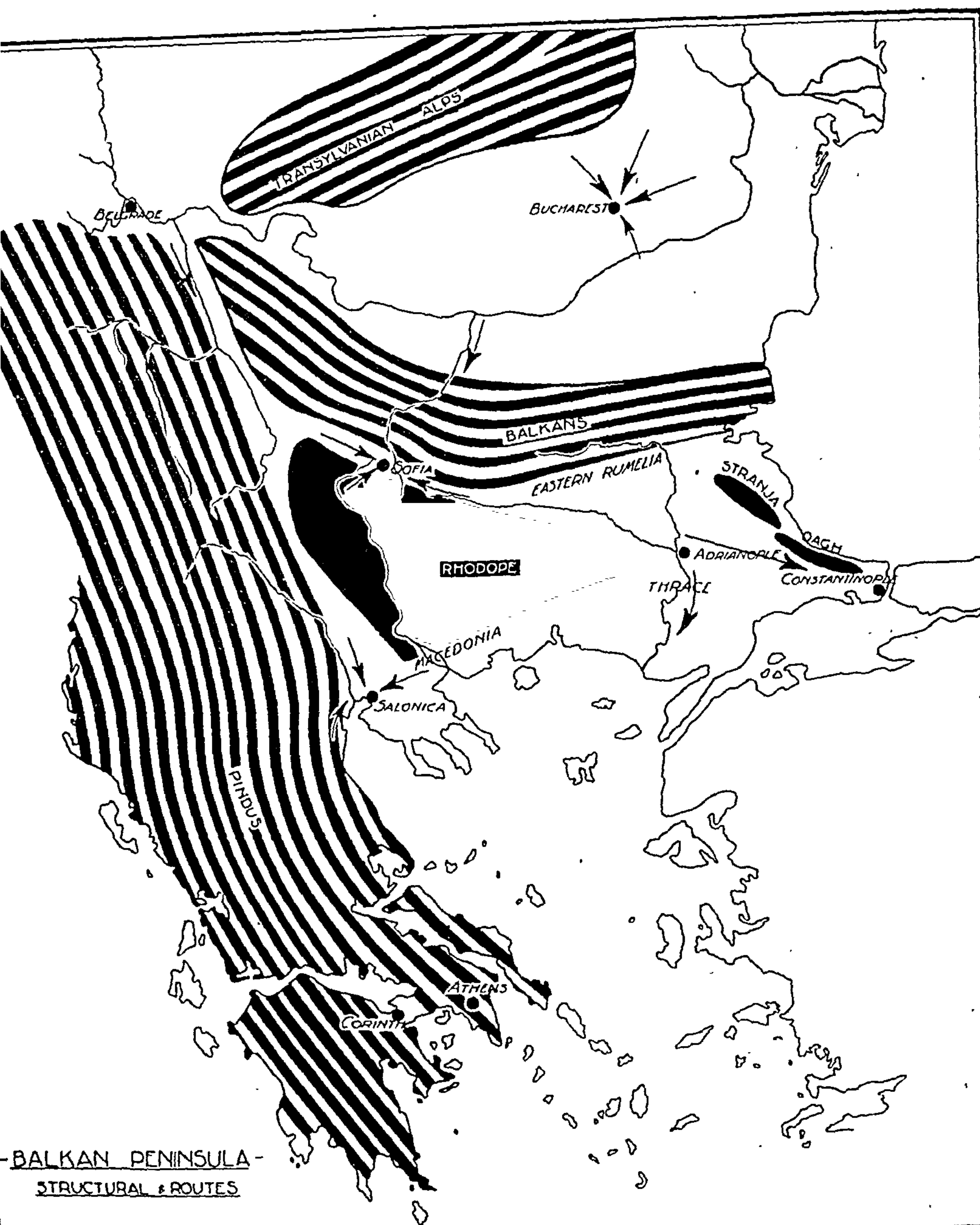

TRANSYLVANIAN ALPS
BUCHAREST
BALKANS
SOFIA
EASTERN RUMELIA
STRANJA
DAGH
ADRIANOPLE
RHODOPE
THRACE
MACEDONIA
SALONICA
PINDUS
ATHENS
CORINTH
-BALKAN PENINSULA-
STRUCTURAL & ROUTES

Fig. 52

principal chain of these mountains is the Pindus, which forms the "backbone" of Greece, but there are scores of subsidiary ranges to the east and west of it.

(*b*) In the borderland between Bulgaria and Serbia the Rhodope Mountains *represent an old block of land which has been* cut up by the agents of denudation into a confused mass of mountains and valleys.

(*c*) In the north, between the Rhodope and the Danube, are the Balkan Mountains.

The chief rivers of the region are :—

(*a*) The Morava, a tributary of the Danube. This is formed by three head-streams, the Serbian Morava, the Bulgarian Morava, and the Nishava.

(*b*) The Vardar.—This river continues the line of the Bulgarian Morava, but flows southward from Uskub to the Gulf of Salonica.

(*c*) The Maritza.—This drains the plain of eastern Rumelia between the Balkans and the Rhodope, then turns southward after receiving the Tunja tributary at Adrianople, and enters the sea at Enos. About forty miles from its mouth it receives the tributary river Ergene, which flows from the Istrandja Dagh, the ridge whose continuation in Turkey makes the peninsula on which Constantinople stands.

Several important peninsulas and lowlands may be distinguished. They are :—

(1) The peninsula of Morea or the Peloponnesus in southern Greece. This is cut off from what may be termed continental Greece by the Gulf of Corinth The isthmus of Corinth, which joins the Ægean Sea on the east to the Ionian Sea on the west, is only four miles wide. A ship canal connects the two seas.

(2) The plain of Thessaly, on the eastern side of "continental Greece," is ringed almost completely round by spurs from the Pindus.

(3) The Macedonian lowland, around the mouths of the rivers Vardar, Struma, and Mesta.

(4) The Chalcidice peninsula, which in shape is a miniature reproduction of Morea. It is separated from the mainland, not by an arm of the sea, but by a line of lakes.

(5) Eastern Rumelia, the fertile plain of Bulgaria, situated in the valleys of the Maritza and the Tunja, and between the Rhodope and the Balkans

(6) Thrace is the lowland between the Rhodope, the Istrandja Dagh, and the Tekir Dagh (on the northern side of the Sea of Marmora).

(7) The Danubian plain of northern Bulgaria, drained by the rivers Isker, Yantra, etc.

These areas of lowland are exceedingly important in the economic geography of the region, as not only do they control the direction of the great routes, but they also provide the only large areas of cultivable land.

The islands of the Ægean Sea may be grouped either according to their structural relationships or according to their geographical terminology. From the latter point of view four groups are recognised, viz. :—

(*a*) The Cyclades, which include all the islands between Crete and Eubœa.

(*b*) The Dodecanese, meaning the "twelve" islands, of which Rhodes and Kos are the chief.

(*c*) The Sporades or "scattered" islands.

(*d*) The Ionian Isles, off the western coast of Greece. Looked at from the point of view of structural relationships, the Cyclades and the Dodecanese, as well as the larger islands of Crete and Cyprus, are seen to be the remnants of ridges which once connected the Pindus Mountains with the similar ridges of Asia Minor. The Sporades are parts of a similar submarine ridge which can be traced north-eastward through Lemnos and Imbros to the Gallipoli peninsula. The Ionian Isles represent a partially submerged coastal range.

2.—**Climate.** Two distinct types of climate may be distinguished within the region. In Greece, Albania, and the Adriatic coast-lands there is a Mediterranean type of climate with winter rain. In Bulgaria and Serbia, on the other hand, the climate s continental, with a high range of temperature, and the most ain in summer. Of the first region Athens may be taken as ypical. The temperature ranges from 48° F. in January to 1° F. in July ; the rainfall averages 15 inches per year, of which ore than three-quarters falls in the winter half of the year.

Sofia may be taken as typical of the continental climatic visions. Its temperature ranges from 27° F. in January to 69° F. July, and its average annual rainfall is 25 inches, of which about -thirds falls in the summer half of the year.

The mountains, of course, introduce great variation in the ate, the higher mountains receiving considerable rainfall at arts of the year, and having considerably lower temperatures the lowlands.

3.—**Routes.** The great cross-routes of the Balkan region, e Morava, Vardar, and Maritza, have already been mentioned age 203).

ther routes which are of more local importance are :—

) From Salonica southward along the coastal plain on the f the Gulf of Salonica, past the historic mountain of Olympus

then through the middle of the plain of Thessaly, and along the coastal plain through Thebes to Athens, and then on to Corinth and Patras.

(2) From Salonica westward through Ostrova to Monastir in southern Serbia.

(3) From Salonica eastward along the coastal plain of Macedonia to join the main Morava-Maritza route at Adrianople.

(4) From Adrianople a line runs southward to the port of Dedegatch, which, though in Grecian territory, is also meant to serve Bulgaria.

(5) From Philippopolis a line runs northward along the foot of the Balkans to Burgas on the Black Sea.

IV.—Greece

On account of the mountainous nature of the country and the aridity of the interior valleys, only about one-fifth of the surface is cultivated. Sheep-rearing is important in the drier regions of peninsular Greece, and on the lowlands of Thrace and Macedonia. Cattle-rearing is profitable only on the moister lowlands. Goats are everywhere pastured on the hillsides.

The chief crops cultivated are vine, olive, wheat, oranges, lemons, tobacco, and maize. Currants form one of the chief exports of Greece; the name itself is said to be derived from Corinth, the port from which nearly all the crop was formerly shipped. The only other important exports are tobacco and olive oil.

Minerals are not plentiful, though some coal is mined in the island of Eubœa; emery is found in large quantities on the island of Naxos, and some iron ore is obtained from various districts Excellent marble is also obtained in Attica.

Manufactures are concerned principally with the preparation of the agricultural products, e.g wine, tobacco, olive oil, and though a start has been made at Piræus in the manufacture of cotton, nearly all manufactured goods have to be imported

The chief towns are Athens, the capital; Piræus, the port for the capital; Patras, a port on the south side of the Gulf of Corinth; Corfu, a port on the island of the same name off the west coast of northern Greece; Salonica, which has already been noted as the terminus of one of the great cross-routes of Europe and as the focus of local routes

Crete.—This island forms part of Greece and reproduces the chief physical and economic features of the mainland It is very mountainous, some of the peaks almost reaching the snow line. The mountain sides are usually bare of vegetation, but

the lower slopes and the valley floors are fertile. The chief crops cultivated are olives, grapes, silk, oranges, lemons, wheat, and maize. The principal town is Canea on the north coast.

V.—Bulgaria

Bulgaria is essentially an agricultural country. A great variety of crops are cultivated; these include almost every important field crop of Europe—wheat, barley, rye, sugar beet, maize, vines. Important specialities are tobacco and roses. Tobacco is cultivated chiefly in the region of the Maritza valley around Philippopolis and Khaskovo (100 miles to the south-east of Philippopolis). Roses are cultivated in eastern Rumelia for the distillation of otto of roses.

Bulgaria is not rich in minerals, but some coal of poor quality and a little iron and lead, are mined. Salt is obtained from salt lagoons on the Black Sea coast.

Sofia, the capital, is situated in a fertile mountain-ringed basin where the main Morava–Nishava–Maritza route is crossed by a route which runs from Rumania, via the Isker valley, then down the upper Struma valley to Kostendil, and across the mountains to join the Morava–Vardar route from Belgrade to Salonica.

Philippopolis is situated at the head of navigation of the Maritza river, in the centre of a very fertile lowland basin, and on the great Belgrade to Constantinople route. It is the chief market and commercial centre for eastern Rumelia. It trades chiefly in the products of the surrounding region—wheat, scent, tobacco, wine, silk, and rice.

Varna, on the Black Sea, is the chief port of Bulgaria. Its harbour is ice-free, and affords safe anchorage for fairly large vessels. Its chief exports are hides, leather, wine, grain, tobacco, and scent; its imports are coal, oil, clothing, iron goods and machinery.

Burgas is also an ice-free port on the Black Sea coast.

VI.—Turkey in Europe

Although Turkey was formerly master of the whole of the Balkan region, the only European territory now remaining to her is the land between the Sea of Marmora and the Maritza river. The climate of the region is of the Mediterranean type. Constantinople has about 30 inches of rain per annum, of which about two-thirds falls in the winter half of the year. The temperature is, however, more extreme than in typically

Mediterranean regions, ranging from 40° F. in winter to 80° F. in summer. The weather is subject to great variations; the temperature in winter often drops below freezing-point, and showers of snow and sleet occasionally occur.

Agriculture in the region suffers from neglect, but the land is naturally fertile, and good crops of wheat, maize, and oats are obtained in the better-worked districts. Adrianople, at the head of barge navigation of the Maritza, is the centre of the chief agricultural area.

Interest centres, however, almost entirely on the great city of Constantinople, which is built on one of the most important strategical sites in the world. Here the waterway from the Black Sea to the Mediterranean via the Bosporus, the Sea of Marmora, and the Dardanelles, crosses the diagonal land route of the Old World, from Paris, Berlin, etc., through Vienna, Budapest, and Belgrade to Constantinople, and thence via the Bagdad Railway through Asia Minor to Mesopotamia, and then on to Persia and India. The city stands on the Golden Horn, the long narrow estuary of a stream which flows into the south-eastern end of the Bosporus. South of the Golden Horn is the part known as Stamboul; north of it are Galata and Pera; across the Bosporus is Scutari, which is often reckoned as a part of Constantinople.

Being situated between east and west, at one of the great cross-roads of the world, Constantinople is naturally a great trading and shipping centre, dealing not only with the products of the surrounding regions (wine, tobacco, silk, etc.) but also with commodities from Asia and industrial Europe.

VII.—Albania

This small independent State is of little importance from the point of view of economic geography. Its surface is mountainous, its population scanty and primitive in their way of life. They are mostly pastoralists, tending scanty flocks of sheep and cattle. There are no manufactures except for home use. The chief towns are Scutari in the north, Durazzo in the middle of the stretch of rocky coast, and Koritza in the south. None of these has more than 30,000 inhabitants. There is not a mile of railway in the country.

SECTION III.—NORTH AMERICA

Chapter XVII

GENERAL RELATIONSHIPS

1.—**Relief.** A study of the coloured physical maps of Canada and U.S.A. in the Atlas will show that the continent of North America can be divided into the following physical divisions :—

(1) *The Western Mountains.*—These are composed of several ranges, plateaux, and basins, viz. :—

(*a*) The Rocky Mountains, which form the eastern edge of this system. They run from Alaska in the north to Mexico in the south. Special names are given to various parts of this great range, e.g. the Pelly Mountains in the Yukon province of Canada, the Big Horn Mountains in Wyoming, and the Sangre de Cristo range in Colorado and New Mexico. In Mexico the eastern Sierra Madre represent the continuation of the Rockies.

(*b*) The Cascades and Sierra Nevada. The Cascade range runs parallel to the west coast of Canada and U.S.A., down to the southern boundary of Oregon, beyond which the name is changed to the Sierra Nevada. Beyond the United States border the range is continued southward as the (Western) Sierra Madre.

Between the Cascade–Sierra Nevada range and the Rockies are wide stretches of plateau and mountainous country, of which the most important divisions are :—

The plateau of British Columbia, with the Gold range and the Selkirks.

The plateau of the Snake river basin.

The great basin of Utah, containing Great Salt Lake in the centre.

The Colorado plateau in Arizona.

The plateau of Mexico, between the eastern and western Sierra Madre.

(*c*) The coast range. In Canada this is represented by the line of islands of which Prince of Wales Island, Queen Charlotte Island, and Vancouver Island are the chief. In United States the range is a proper coast range, running between the Sierra

Nevada and the coast. In Mexico the peninsula of lower California represents the continuation of this range.

(2) *The Central Lowland.*—(*a*) To the east of the Rockies the land forms a great plateau, varying from a height of 3000 feet at the foot of the Rockies to about 1200 feet on the east.

(*b*) Eastward again is the rĕgion known as the Great Central Plain. In United States this plain is drained by the Mississippi and its tributaries. In Canada it is occupied by the Great Lakes (Superior, Huron, Erie, and Ontario) and by a line of smaller lakes running north-westward from Lake Winnipeg, through Lake Athabasca and Great Slave Lake to Great Bear Lake. North and east of this lake-line are the Hudson Bay lowlands, which correspond in some respects to the Gulf Plain on the northern side of the Gulf of Mexico.

(3) *The Eastern Highlands.*—In United States the mountain system is known as the Appalachian Highlands. Commencing about 200 miles north of the Gulf of Mexico, the range runs north-eastward, approaching nearer to the coast, until it runs out to sea in Nova Scotia and the Gaspé peninsula. North of the St. Lawrence is a high plateau called the Laurentides or the Laurentian Highlands.

(4) *Central America and the West Indies.*—The isthmus of Central America, containing the States of Guatemala, British Honduras, Honduras, Nicaragua, Costa Rica, and Panama, is composed of extensions of the combined ranges of the Sierra Madre of Mexico.

The West Indies may be regarded as the unsubmerged portions of ranges which once connected Central America with South America. The most important line is that from the peninsula of Yucatan, through Cuba, Haiti, Porto Rico, and the Leeward and Windward Islands, to Trinidad off the coast of Venezuela.

2.—**Rivers.**

(*a*) Of the rivers flowing to the west coast the only ones of great importance are: the Yukon, draining Central Alaska; the Fraser in British Columbia; the Columbia river, with its large tributary the Snake; the Sacramento river, flowing to the sea at San Francisco; and the Colorado river, flowing to the head of the Gulf of California.

(*b*) The Central Plain is drained in U.S.A. by the Mississippi, which rises at a comparatively low elevation near the Canadian boundary. Its tributaries from the Rockies—the Missouri, the Platte, the Arkansas, the Colorado, etc.—should be carefully noted on the physical map. The most important tributary from the Appalachians is the Ohio, with its tributaries the Cumberland and Tennessee.

In Canada the Central Lowland is drained to the north by the river Mackenzie, which draws its waters partly from the Rockies, and partly from Lake Athabasca, Slave Lake, and Great Bear Lake. The prairie provinces of Alberta and Saskatchewan are drained by the North and South Saskatchewan rivers to Lake Winnipeg. From the northern end of the lake the river Nelson runs to Hudson Bay.

(*c*) On the east coast the most important river is the St. Lawrence, which drains the Great Lakes to the Gulf of St. Lawrence.

In United States a number of comparatively short streams—the Connecticut, the Merrimac, the Potomac, the Hudson, the Susquehanna, and the James—form important highways from the coast through the front ranges of the Appalachians.

3.—**Climate.** As Central and Northern America range from 10° north of the Equator to near the North Pole, as well as from sea level, to heights of over 10,000 feet, very great variations of climate are to be found within the continent.

Temperature.—The January map (see Fig. 53) shows that the isotherms bend southward over the land, indicating that the interior is much colder than the coast. Thus the 0° F. isotherm touches the northern shore of Lake Superior, while at the same latitude on the west coast the temperature is 40° F. and on the east coast the temperature is 20° F.

Again, the east coast is much cooler than the west coast in winter, as will be seen from the above example. The reason for this latter fact is that on the west coast the westerly winds blow from the relatively warm ocean, while on the east they blow from the cold interior.

In July the bend of the isotherms is reversed, showing that the interior is warmer than the coast. Along latitude 50° N. the following sea-level temperatures occur: on the west coast, 60° F.; Winnipeg, 66° F.; on the east coast, 56° F.

From the above statistics for January and July it will be seen that the western coast-lands of Canada have an equable climate, the interior a very extreme climate, and the east coast a rather extreme climate.

In U.S.A. examination of the isotherms shows that the above generalisations are true for that region, as far south as 30° N. In summer the plateau of Mexico and south-western U.S.A. is one of the hottest places in the world, having an average sea-level temperature of over 88° F.

In southern Mexico and Central America the isotherms reveal a climate which is hot all the year round, ranging from about 70° F. in "winter" to 80° F. in summer.

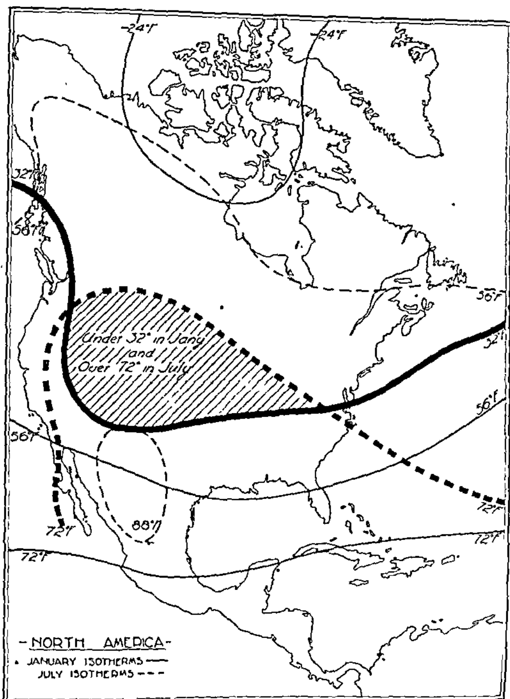


Fig. 53

Rainfall.—Fig. 54 shows eight regions of rainfall in North America.

(1) In the north of Canada is a region with low rainfall in both summer and winter.

(2) Western North America, as far south as latitude 40° N., has rain all the year round from the Westerlies.

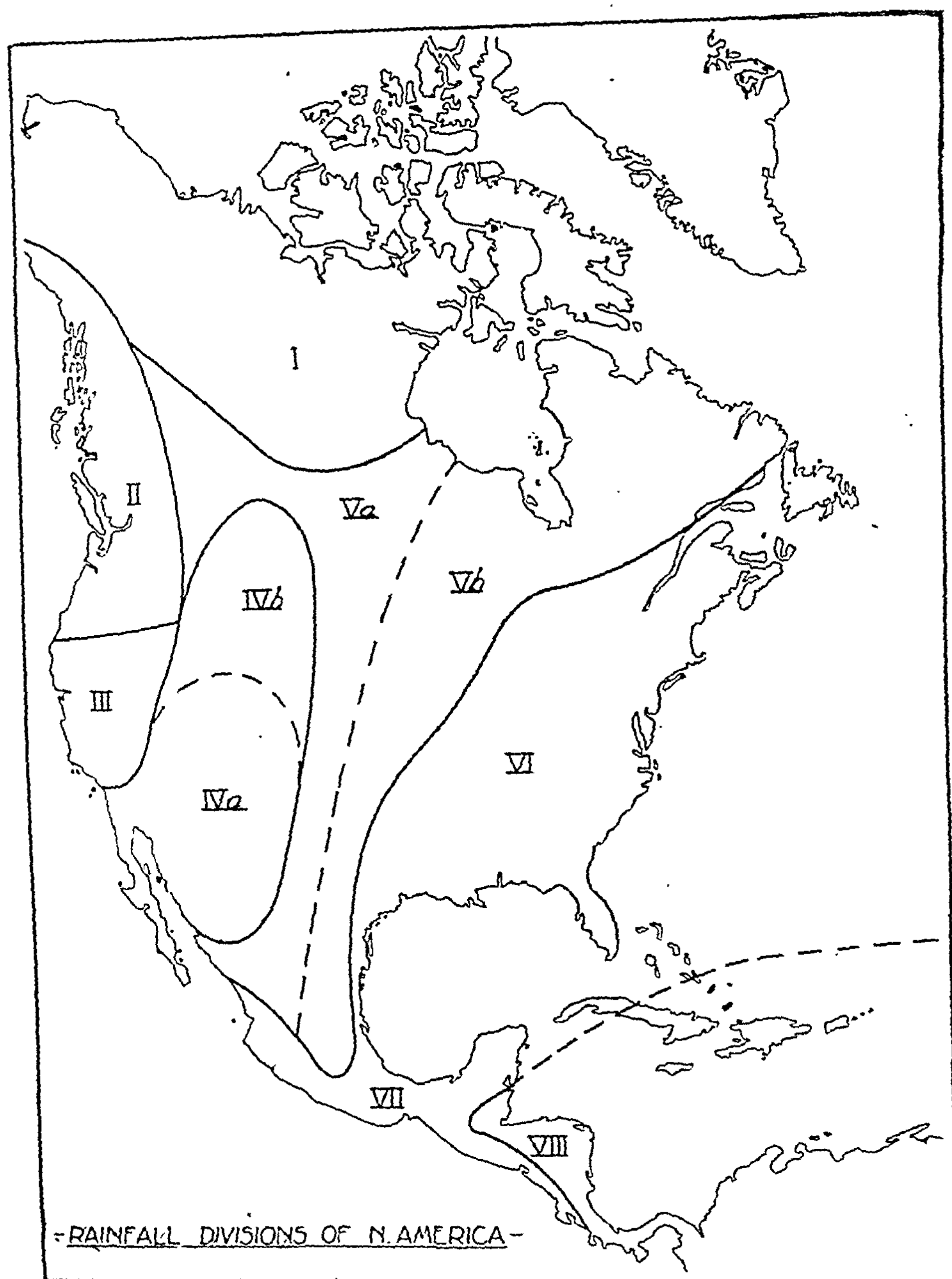


Fig. 54

(3) In California, between latitudes 34° and 40°, is a region

which has rain in winter from the Westerlies, and drought in summer from winds whose general direction is from the north.

(4) Southward again, on the western side of the continent, is a region with low rainfall in both summer and winter, due to the prevailing northerly winds and the encircling ring of high mountain ranges. The southern part of this region (4*a*) has an average of less than 10 inches, and is therefore chiefly desert. The northern half has rather more than 10 inches per annum, and is therefore not absolute desert, though irrigation is necessary for the cultivation of crops.

(5) In the centre of the continent, rainfall is low, averaging 10 to 20 inches in summer and below 10 inches in the winter half of the year. The western half of this region (5*a*) has less rain than the eastern half (5*b*), the difference being most marked in winter, when the region 5*b* has 5 to 10 inches, and the region 5*a* less than 5 inches.

(6) The eastern side of the Continent, between the Gulf of St. Lawrence and the Gulf of Mexico, has adequate rainfall, well distributed throughout the year. The whole region has over 20 inches per year, while the coast-lands and the highlands have considerably more. In the north-eastern part of the region more rain falls in winter than in summer; in the southern part the reverse is true.

(7) Mexico has definite summer rain, the sun being nearly overhead in this season.

(8) Central America and the West Indies have rain at all seasons from the Trade Winds, but more falls in summer than in winter.

4.—**Vegetation.**

(1) The northern region, above 60° N., is of the tundra type, ice-bound in winter, but covered with marsh, grass, and flowering plants in the brief summer.

(2) The western mountains are covered with forests, chiefly of the coniferous type.

(3) In California the vegetation is of the Mediterranean evergreen type.

(4) The Great Basin, the Colorado plateau, and the central plateau of Mexico have desert and semi-desert types of vegetation, due to the aridity.

(5) Northern Canada, between the St. Lawrence and Hudson Bay, and north of a line from Lake Winnipeg to the Peace river, is a forested area, the chief trees being spruce, pine, and fir

(6) Between the Mississippi and the Rockies, and between the northern forest and latitude 30°, is a region of grass-land. The

eastern half of this region is the good natural grass-land known as

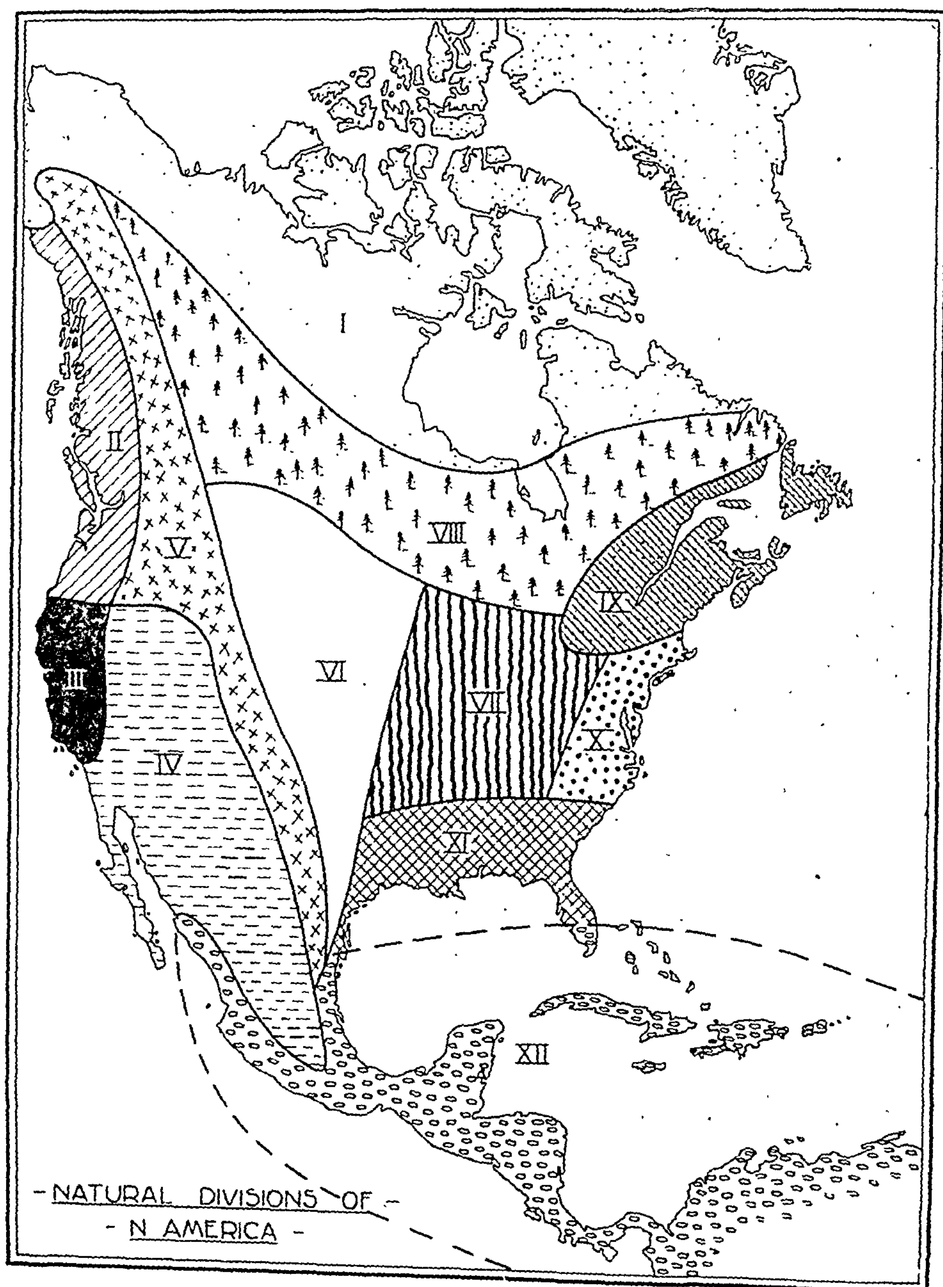


Fig. 55

the Prairies; on the west, towards the foothills of the Rockies, the grass is poorer, owing to the increasing altitude and aridity.

(7) The Gulf Plains, north of the Gulf of Mexico, were in their natural state covered with evergreen forests, but these have been largely cleared, except on the marshy lands near the coast.

(8) The coast-lands of Central America and the moister parts of the islands of the West Indies are covered with tropical forests.

5.—**Natural Regions.** Taking into account what has been learnt about the relief, temperature, rainfall, and natural vegetation of North America, the continent may be divided into the following Natural Regions (see Fig 55):—

(1) The Tundra Region.

(2) The West Temperate Region. This has a climate somewhat like that of the British Isles, with rain at all seasons, cool summers, and warm winters. Its natural vegetation is forest, with grass-land in the sheltered valleys.

(3) The Warm West Temperate Region. This has rain in winter, drought in summer, an equable climate, and evergreen vegetation. It is thus of the Mediterranean type.

(4) The Desert and Semi-desert Region.

(5) The mountain regions, where climate and vegetation vary rapidly with altitude.

(6) The Central Grass-lands, with an extreme climate, rather low rainfall with a summer maximum. Rainfall increases towards the east and south.

(7) The Central Plains, between the Ohio, the Great Lakes, and the Mississippi. Here rainfall is fairly heavy, both in summer and winter, the climate is fairly extreme, and the natural vegetation is deciduous forest and meadow-land

(8) The Northern Forest Region of Canada

(9) The St. Lawrence Region, which has warm summers and cold winters, with adequate rainfall.

(10) The Atlantic Coast Region of U.S.A., with hot summers, rather cold winters, and rain at all seasons.

(11) The Gulf Plains, with warm winters and hot summers, and fairly heavy rainfall, most occurring in summer

(12) The tropical summer rain regions of Central America, the West Indies, and the Mexican coasts

Chapter XVIII

BRITISH NORTH AMERICA

I.—NEWFOUNDLAND

THIS island, along with the coastal strip of Labrador, forms a self-governing colony independent of the Dominion of Canada. The island is situated at the mouth of the St. Lawrence, being separated from Labrador by the Strait of Belle Isle, and from Cape Breton Island by Cabot Strait. The surface of the country is hilly, and is covered mainly with pine forest and marsh. The climate is cold, partly because of the cold northerly and westerly winds, and partly because of the cold Labrador current which flows from the north. The surrounding seas are ice-bound in winter. In summer the climate is cool, but subject to fog, which is due to the mixing of the cold air above the Labrador current with the warm air above an extension of the Gulf Stream which flows from the south.

Agriculture.—A little cultivated land is found near the coast, but the climate is too damp and sunless for wheat. The chief crops are grass, potatoes, oats and turnips.

Lumbering.—Although the coast-lands are usually bare of trees, valuable forests of spruce occur in the interior. The chief use for the timber is in the manufacture of wood pulp.

Fishing is the staple industry of the people. The shallow seas of the Newfoundland Banks form one of the most valuable cod-fishing grounds in the world. Seals and whales are killed in the northern seas and lobsters are caught in the rocky inlets of the coast.

Mining.—Valuable deposits of iron ore occur on Belle Island off the east coast. It is taken to Sydney on Cape Breton Island for smelting.

Towns.—The only important town is St. John's, the capital and chief port, situated near the eastern end of the island.

II.—LABRADOR

The coast-land of Labrador is very similar to Newfoundland in climate and economic geography, except that its inhabitants include a considerable proportion of Eskimos, who live by hunting,

fishing, and sealing. Newfoundland fishermen often establish temporary stations on the coast during the summer; otherwise there is little communication with the outside world. There are no towns of importance, the settlements being chiefly poverty-stricken Eskimo encampments.

III.—THE DOMINION OF CANADA

(*A*) THE MARITIME PROVINCES. The provinces on the southern side of the Gulf of St. Lawrence include Nova Scotia (with Cape Breton Island), New Brunswick, and Prince Edward Island. The chief features of the relief are the spurs of hills running from south-west to north-east which represent the continuation to the Appalachian mountain system. These spurs account for the principal features of the coast, e.g. the long peninsula of Nova Scotia, the bipartite form of Cape Breton Island, and the long funnel-like gulf named the Bay of Fundy.

(1) *Nova Scotia.*—The greater part of the peninsula consists of hard, old rocks which provide but scanty soil. There are, however, some exceedingly fertile places, where deeper soil allows the cultivation of crops. The chief of these fertile patches is the famous Annapolis valley, facing the Bay of Fundy, where large quantities of apples are produced.

(2) *Cape Breton Island*, which is politically a part of Nova Scotia, is almost cut in two by an arm of the sea known as Bras d'Or. This forms an excellent harbour, and has been connected by [illegible] from [illegible] is due to the presence of coal, which is mined at Sydney, the chief town.

Halifax, on the east coast of Nova Scotia, has a magnificent harbour which, unlike the mouth of the St. Lawrence, is ice-free in winter. It is therefore one of the termini for transatlantic steamers, passengers and goods being disembarked there and transported by rail to Montreal.

(3) *New Brunswick.*—This province consists of a low coastal plain on the west of the Bay of Fundy, and a mountainous, forested interior. The region is on the whole undeveloped, the chief economic activities being lumbering and fishing. It is expected, however, that increasing numbers of colonists will settle on the cleared land in the near future.

St. John, situated at the mouth of the St. John river, is an ice-free port which rivals Halifax in its importance as a winter terminus for transatlantic liners.

Fredericton, the capital of the province, is situat[illegible] river St. John, ninety miles from the mouth.

(4) *Railways.*—The chief railway routes in the maritime provinces are :—

(*a*) From Halifax, round the northern end of the Bay of Fundy, and along the coastal plain of New Brunswick to the south bank of the St. Lawrence, and so to Montreal.

(*b*) From St. John, directly westward through the state of Maine (U.S.A.) to Montreal. This, the shortest route from Montreal to a British ice-free port, gives St. John an advantage over Halifax.

(*c*) South-westward from St. John, along the narrow coastal plain to the ports of Portland, Boston, etc., in U.S.A.

(*B*) THE PROVINCES OF QUEBEC AND ONTARIO. In this region natural divisions may be distinguished, viz. :—

(1) *The plateau region* north of the Great Lakes and the St. Lawrence. This is an area of hard, old rock from which the soil has been scraped by the action of glaciers. As far north as the southern point of James Bay the land is covered with forests, which provide one of the world's chief sources of lumber. The trees felled down in winter, and floated down the streams in spring to sawmills and pulp mills at the mouth. North of about latitude 50°, however, the forest thins out, and gradually gives place to the barren, treeless, tundra-like region on the shores of Hudson Strait. In this region the only industry is the trapping of fur-bearing animals.

In Ontario, to the north of Lake Superior, valuable mineral deposits are worked. Sudbury is the centre for nickel mining, Cobalt for silver, and Timmins for gold.

(2) *The St. Lawrence Lowlands.*—The strip of fertile plain bordering the St. Lawrence has a width varying from a few miles near Quebec to 70 miles at Montreal. On these fertile lands, which are farmed mainly by people of French descent, the chief occupations are dairy-farming, and the cultivation of oats, barley, etc., for home consumption ; much butter and cheese are exported. Most of the world's supply of asbestos is mined near a town of that name, south of Quebec.

Quebec is situated where the river begins to widen out to its estuary. A high cliff provided opportunities for defence, and Quebec long held the key to Canada. It was formerly the head of ocean navigation, but the channel has now been improved to allow ocean liners to steam up to Montreal, although some of the largest still make Quebec their summer terminus.

Montreal is situated near the confluence of the river Ottawa with the St. Lawrence. Above it, on the main stream, are the Lachine Rapids, which prevent ocean-going steamers from proceeding further up-stream. Besides being the head of ocean

navigation, Montreal is at the meeting-places of many important land routes, viz. :—

(a) From St. John and Halifax.

(b) From Portland (Maine).

(c) From the Great Lakes and the Lake Peninsula via Toronto and Kingston.

(d) From the interior of Canada, down the Ottawa valley.

(e) From New York via the valley of the Hudson river and Lake Champlain.

It has, therefore, become the great trading and manufacturing centre for the whole of eastern Canada. It exports great quantities of wheat, flour, timber, wood pulp, and cattle. Its chief industries are flour milling, sugar refining, and the manufacture of textiles.

Ottawa, the capital of the Dominion, is situated at the head of navigation of the canalised river Ottawa. Above it are the Chaudière Falls, which provide power for numerous sawmills and pulp mills.

Tadoussac is a small port situated on the northern side of the St. Lawrence estuary, at the confluence of that river and the Saguenay. This river flows from Lake St. John, which is situated in the middle of a region of great beauty. A triangular railway route connects Quebec, Lake St. John, and Tadoussac.

Rimouski, on the southern side of the St. Lawrence, is the point where the Canadian National Railway from Halifax first touches the St. Lawrence coast. Here, therefore, mails are landed from the liners, and rushed by fast trains to Quebec, Montreal, Ottawa, etc.

(3) *The Lake Peninsula.*—This is the region between Lake Huron on the west, and Lakes Erie and Ontario on the south-east.

Here the climate is warm in summer, while the cold of winter is moderated by the water of the Great Lakes. The land is fairly level, and the soil fertile. This region is, therefore, pre-eminently suitable for fruit farming. The chief fruits cultivated are apples, pears, cherries, plums, and grapes. Cereals such as barley, oats, wheat, and even maize, are cultivated, though the wheat can barely compete in price with that produced by the large-scale farming of the prairies. Dairy-farming is also important, and lumbering is carried out in the northern district between Georgian Bay and the river Ottawa.

Though the area is not very rich in minerals some coal, oil, and salt are found in the extreme south-west, between Lake Huron and Lake Erie. Water power is also available, not only from Niagara, b[illegible]s in the peninsula. This region, on [illegible]cility for manufactures, is the mos[illegible]nada. The chief towns

are Toronto, the capital of Ontario, situated on the eastern shor of Lake Ontario; Kingston, at the north-eastern end of the same lake, at the point where the Rideau Canal from Ottawa joins the St. Lawrence; Hamilton, situated at the south-western end of Lake Ontario; and London, situated in the centre of a fertile fruit-growing, agricultural, and dairying district.

(4) *The Great Lakes.*—Lakes Superior, Huron, Erie, Ontario, and Michigan (this last is entirely in U.S.A., while the rest are equally divided between Canada and U.S.A.) form the most valuable inland waterway in the world. At the head of Lake Superior the ports of Port Arthur and Fort William, situated close to the international boundary, are the meeting-points of the railway routes from Winnipeg with the steamer route down the Lakes. Between Lakes Superior and Huron were the rapids of the Sault Ste. Marie; these have now been canalised, and more traffic passes through the "Soo" Canal, as it is termed, than through the Suez Canal. Between Lake Huron and Lake Erie the channel of the St. Claire river, which flows through the small Lake St. Claire, has also been deepened to allow the passage of the lake steamers. The Niagara Falls, between Lakes Erie and Ontario, are avoided by the Welland Ship Canal. This canal is now being deepened so as to enable it to take ocean-going vessels, but the St. Lawrence between Kingston and Montreal is rather shallow and is spoilt by the Lachine Rapids. Proposals for deepening this portion of the river, and so providing a first-class waterway from the sea to the head of Lake Superior, are under consideration by the Canadian Government. It has also been proposed to build a ship canal from Georgian Bay to the river Ottawa.

(*C*) THE PRAIRIE REGION. The three "prairie provinces" of Canada are Manitoba, Saskatchewan, and Alberta; but the real prairie region is restricted to the southern portion of these provinces, between the international boundary on the south, the foot of the Rockies on the west, and on the north a line running from the southern end of Lake Winnipeg to Lesser Slave Lake.

The climate of this region is very extreme; the winters are ery cold, the summers warm and sunny; rainfall is rather low, arying from about 20 inches at Winnipeg to 18 inches at dmonton, and about 12 inches in southern Alberta. The soil very fertile, that in southern Manitoba especially so. The nd is fairly level and easily adapted to large-scale farming. ese conditions are eminently suited for the cultivation of wheat, ich has therefore become the staple crop of the region.

The limits of the wheat-growing area have been pushed dually farther and farther west. Commencing with the rich vial soil of an old lake-bed south and west of Lakes Winnipeg

and Manitoba, the wheat lands have been extended into southern Saskatchewan, which is now the greatest producer of wheat, and has in late years displaced the ranching which was formerly the characteristic industry of southern Alberta. The northern limit of wheat-growing is now fixed by the forest belt north of Saskatoon and Edmonton. In the south the elevated region about the international boundary in southern Alberta and south-western Saskatchewan is too dry and infertile for the cultivation of wheat. Near the foot of the Rockies an important factor in the cultivation of wheat is the "chinook."
down the valleys of the R

Winnipeg, Regina, Calgary, Saskatoon, and Edmonton.

Winnipeg. Sixty years ago this was a small trading station of the Hudson Bay Company. Now it has a population of 180,000, and is the chief railway centre, distributing and collecting station for the whole of central Canada, and for the wheat lands in particular. It owes its rapid rise and present importance to the fact that all railways from east to west must pass within about 40 miles of it, in order to avoid Lake Winnipeg on the one hand, and to keep within the international boundary on the other. When the first railway was buil
that all subsec
Consequently a
of lines, diverging from Winnipeg to west and east. The following important routes should be traced on the map:—

(1) *The Canadian Pacific Railway.*—(*a*) The main line starts at St. John, New Brunswick's ice-free port, and passes directly through the State of Maine (U.S.A.) to Montreal; thence it follows the Ottawa valley via Ottawa and Sudbury, round the northern side of Lake Superior to Port Arthur and Fort William, and then runs due eastward, through the Rainy river district, and north of Lake of the Woods to Winnipeg.

(*b*) Westward from Winnipeg, the main line runs through Brandon, Regina, and Moose Jaw to Medicine Hat, about 40 miles west of the boundary between Alberta and Saskatchewan. Here the line branches, one route going north-westward through Calgary,
while the
nd across

(*c*) A second line from Winnipeg runs north-westward through Saskatoon to Edmonton.

(2) *The Canadian National Railways.*—(*a*) The Grand Trunk

Pacific Railway starts at Halifax, runs north-westward through the Maritime Provinces to Rimouski on the southern shore of the St. Lawrence. From there it proceeds on the southern side of the river to Levis, and crosses by a fine bridge to Quebec. From that city it runs westward through a sparsely populated region to Cochrane, in the fertile "clay-belt" midway between Georgian Bay and James Bay. Beyond Cochrane the country is again forested and undeveloped until the boundary of Ontario is reached.

(*b*) The Canadian Northern Railway runs from Portland in the State of Maine to Montreal, and thence follows the general direction of the Canadian Pacific to Winnipeg.

(*c*) West of Winnipeg the Grand Trunk Pacific and the Canadian Northern pursue courses almost parallel to the branch of the Canadian Pacific from Montreal to Edmonton. Beyond that town, which has rapidly increased in importance, a combined "National" line crosses the Rockies by the Yellowhead Pass.

(*d*) A line has recently been constructed from Winnipeg, along the western side of Lakes Manitoba and Winnipegosis and then down the valley of the Nelson river to Port Nelson on Hudson Bay. This stretch of water is open for navigation for about three months in the year, and as the distance from Port Nelson to Liverpool is much shorter than that from Port Arthur to Liverpool, it is hoped that the new railway will divert to Port Nelson a considerable proportion of the wheat now exported via Montreal, Halifax, Portland, etc.

In addition to the great quantities of wheat grown, the prairie provinces also produce large crops of oats, barley, vegetables, and dairy produce. In the towns there is considerable industrial activity, concerned chiefly with agriculture, e.g. flour milling, the canning of foodstuffs, and the manufacture of agricultural machinery.

Extensive beds of coal are known to exist in Alberta, between Medicine Hat, Calgary, and Edmonton. Though as yet the coal is practically unworked, it may in the future convert this region into an important manufacturing area.

Three factors which have caused the extension of the cultivated area within recent years are :—

(*a*) Irrigation, which is practised on a large scale on the head-waters of the South Saskatchewan, around Calgary and Lethbridge.

(*b*) Dry farming, by which land which does not receive sufficient annual rainfall for cultivation in the ordinary way is made to produce crops of wheat. The method is to crop the land only once every two years, the ground being frequently harrowed during the fallow year so as to keep a large part of that year's rainfall within the soil.

(*c*) The extension of the railways north of Edmonton to Grande Prairie at the foot of the Rockies, and to McMurray on the Athabasca river, 150 miles south of Lake Athabasca. This has opened out large tracts of country for new settlers.

(*D*) British Columbia.

1. **Position and Boundaries.**—The eastern boundary of British Columbia, between latitudes 49° N. (the international boundary) and 54° N., is formed by the highest ridge of the Rockies, which marks, roughly, the watershed between the Pacific drainage on the one side and the Arctic and Atlantic drainage on the other. North of 54° N. the boundary is the line of longitude 120° W.

On the south the international boundary on the mainland follows latitude 49°, but it curves southward to include the whole of Vancouver Island. On the north the boundary is latitude 60°. On the west the northern half of the coast between latitudes 55° and 60° belongs to Alaska.

2. **Relief.**—Almost the whole of British Columbia is above 3000 feet in height, the only exceptions being the extreme north-east corner, an area about the centre of the province around the headwaters of the Peace river, a narrow coastal strip, and some of the deep valleys of the interior.

Within this tangled mass of mountains the following ranges may be distinguished:—

(*a*) The Rockies, on the eastern edge, rising to heights of over 13,000 feet in Mount Forbes, Robson's Peak, etc., and broken only by a few passes such as Crow's Nest Pass (5500 feet), Kicking Horse Pass (5300 feet), and Yellowhead Pass (3700 feet).

(*b*) West of these are the roughly parallel ranges of the Cariboo, the Selkirks, the Gold Range, and the Purcell Range. These are often grouped together as the Gold Ranges.

(*c*) Westward again is the great plateau of British Columbia, dissected by the deep valleys of many rivers.

(*d*) Near the coast is the Cascade Range, with an average elevation of between six and seven thousand feet.

(*e*) The fringe of islands off the coast represents the continuation of the partially submerged Coast Range of U.S.A. The actual coast of British Columbia is similar to that of Norway, most of the inlets being of the fiord type.

3. **Rivers.**—The chief stream is the Fraser, which rises in the Rockies near the Yellowhead Pass, flows northward in a deep trench between the Rockies and the Cariboo Range, then turns southward via Lytton and Yale, to enter the sea at New Westminster, a little south of Vancouver. Its chief tributary is the North Thompson river, which rises near the Yellowhead Pass, and pursues a direct course south-westward to Lytton. A

tributary of this stream is the South Thompson river, which cuts an important pass across the Gold Range.

In the north of British Columbia the chief river is the Skeena. A tributary of this river, the Bulkley, rises near the headwaters of the Nechacho, a tributary of the Fraser, and the "through valley" in which these streams flow forms an important line of communication.

In the south the chief rivers are the Columbia, and its tributary the Kootenay. Rising near together in the deep valley between the Rockies and the Selkirks, these rivers flow in opposite directions, the Columbia northward and then southward, so as to enclose the Selkirk Range, the Kootenay southward then northward to enclose the Purcell Range. The combined stream then flows southward to enter the sea at Portland in the State of Oregon (U.S.A.).

4. **Climate.**—The varying elevation of the land causes a great variety of climate in British Columbia. The coast-lands have a climate similar to that of western Britain, with cool summers, mild winters and abundant rainfall well distributed through the year. The mountains of the interior show every gradation of temperature from the valley floors to the snow-capped summits. The interior valleys in many cases suffer from drought, the winds being robbed of their moisture by the intervening ranges; the great valley between the Rockies and the Selkirks, for example, has less than 15 inches of rainfall, which, apart from irrigation, is insufficient for agriculture. Accompanying the decrease of rainfall in the interior valleys is an increase in range of temperature.

5. **Vegetation.**—The heavy rainfall of the coast-lands and the mountain sides has caused these parts of British Columbia to be covered with forest, composed chiefly of Douglas fir, spruce and pine. In the interior valleys, however, there is some grassland, though the valley floors often show semi-desert types of vegetation.

6. **Occupations.**

(*a*) *Lumbering*, with its associated activities, forms one of the staple industries of British Columbia. Sawmills are usually situated either near the coast, or near the railway in one of the interior valleys. Vancouver is the chief centre of the industry.

(*b*) *Mining*.—The early development of British Columbia was due to the presence of gold. Although the richest deposits are now exhausted, considerable quantities are still obtained in the Cariboo Range, and round Lillooet, on the Fraser River.

Other metals which are mined are copper, which is mined chiefly in the Cassiar district, and silver, which is found near Lake Kootenay.

Coal is known to exist in many places but is only mined close to the railway (e.g. near Crow's Nest Pass) or near the coast, as in Vancouver Island.

(c) *Fishing.*—Salmon fisheries are of the greatest importance. The fish ascend the Fraser, Skeena, and other rivers of the west coast at the spawning season. The chief canning centre is New Westminster at the mouth of the Fraser.

(d) *Farming.*—The typical farming industry is fruit-growing. Apples, pears, and plums are the chief fruits cultivated, though peaches and vines can be cultivated in the valleys of the south.

7. **Routes and Towns.**—There are three main lines of railway connecting British Columbia with central and eastern Canada. They are:—

(a) The Canadian Pacific route from Lethbridge, which crosses the Rockies by the Crow's Nest Pass, and winds round the southern end of the Purcell Range to Lake Kootenay. Here transport by steamer takes the place of the railway. From Lake Kootenay the line winds through many valleys just north of the international boundary, to reach the Fraser valley at Hope.

(b) The Canadian Pacific route from Calgary crosses the Rockies by the Kicking Horse Pass, then follows the South Thompson river down to Lytton, then the Fraser valley to Hope, New Westminster, and Vancouver.

(c) The Canadian National Railway crosses the Rockies by the Yellowhead Pass. One line follows down the North Thompson to Lytton, another line runs in the valleys of the Fraser, Nechacho, Bulkley, and Skeena rivers to Prince Rupert.

Vancouver is the great port of western Canada. It is situated, not at the mouth of the Fraser, but on Burrard inlet, a little to the north. It exports timber, wheat, fruit, gold, and copper, and is the terminus of trans-Pacific routes to China and Japan

New Westminster, situated at the mouth of the Fraser, is unsuitable for a large port, as the channel tends to be silted up by the alluvium brought down by the river. It is noteworthy as a centre of the lumbering and canning industries.

Prince Rupert is a comparatively new port, situated at the mouth of the Skeena river. As has been noted above, it has direct access to the rich prairie lands of Canada. Though so far north, its harbour is ice-free, and it may prove in future a serious rival to Vancouver.

Victoria, situated on the island of Vancouver, is the capital of the province. It is a port of call for ocean liners.

Nanaimo, also situated on Vancouver Island, opposite Vancouver, is the centre of an important coal-mining area.

Esquimalt is a naval station on the Juan de Fuca Strait, which separates Vancouver Island from the United States.

(*E*) NORTHERN CANADA. The whole of Canada, north of the wheat lands of the prairies, and north of the fertile valleys of British Columbia, is very scantily populated, having a density of less than one per square mile. The southern half of this region, as far north as latitude 60° N., is a tract of virgin forest, which forms one of the world's greatest reserves of timber and fur. Lumbering is at present only carried on in the south-east of the forest area where transport facilities to the more populous centres exist. The fur-trapping industry is largely in the hands of native Indians and half-breeds, who bring their annual catches to trading stations situated at convenient points on the rivers which provide the only means of transport.

North of 60 degrees the forest gradually merges into the tundra, a region almost devoid of inhabitants.

Politically, the area north of latitude 60 degrees is divided between Yukon Territory in the west, and North-West Territory. The latter includes the region of Keewatin on the shores of Hudson Bay.

Physically, the most important feature is the river Mackenzie. The head-streams of this river are the Peace river and the Athabasca, which flow into Athabasca Lake. Other lakes within the basin of the Mackenzie are Great Slave Lake and Great Bear Lake. The Mackenzie ranks as one of the world's great rivers, but is economically of little importance, as it flows to the Arctic Ocean, and its lower course is frozen for the greater part of the year.

The Klondike region, in the valley of the Yukon river, is the only part of this region with a population of over one person per square mile. It is a world-famed gold-mining centre.

(*F*) THE BERMUDAS. This group of small coral islands, situated in latitude 32° N., about 800 miles from the east coast of U.S.A., ranks as part of British North America. The chief industry is the cultivation of fruit and vegetables. The islands are also a holiday resort for rich Americans. The capital is Hamilton.

Chapter XIX

THE UNITED STATES OF AMERICA

I.—THE NEW ENGLAND STATES

THIS division includes the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.

1.—**Physical Features.** The region forms part of the Appalachian mountain system. The grain of the land runs roughly from north to south. The chief ranges of hills are the White Mountains in New Hampshire, and the Green Mountains in Vermont. Between these ranges the Connecticut river flows in a fertile valley almost due south. Between the White Mountains and the coast is a low plateau, which runs out to sea in Maine, forming the characteristic rugged coast of that State. The only large lowland regions are around Boston in Massachusetts and around Narragansett Bay in the little State of Rhode Island.

2.—**Farming.** This was one of the first parts of British North America to be colonised. The Pilgrim Fathers landed near Boston in 1620. The soil is, however, stony and sterile; consequently farmers have not been very prosperous in the region. In recent years, however, many farmers have received a good return from dairy farms, which supply milk, butter, etc., to the inhabitants of the great manufacturing cities.

3.—**Manufactures.** Although this region has neither coal nor iron, it has become the chief manufacturing area of U S.A.

Cotton is manufactured in the south of Massachusetts, at Fall river and New Bedford, and in northern Massachusetts at Lowell. Woollen goods are also manufactured at Lowell. Waterbury, near the mouth of the Connecticut river, is world-famous for its watches. Other manufactures of the region include boots and shoes, machinery, paper, and carpets.

Boston is the chief port of the region. It has suffered in the past from the difficulty of communication with the interior caused by the above-mentioned north-to-south ridges. Railway connection with the Great Lakes district was established by means of tunnels through the mountains, and much of the export trade of the interior is now conducted via Boston.

Portland, in the State of Maine, has already been mentioned

as the terminus of a railway from Montreal, and as an outlet for much of the produce of Canada.

Cambridge is noteworthy as the home of the famous Harvard University.

II.—THE MIDDLE ATLANTIC STATES

These are the three States of New York, New Jersey, and Pennsylvania. Between them they have a population of 22 millions, or more than one-fifth of the total for U.S.A. They are, therefore, of tremendous economic importance.

1.—**Physical Features.** The chief rivers within these States are the Hudson, the Delaware, the Susquehanna, and the Potomac. The Hudson river flows southward parallel to the eastern boundary, in a deep valley which forms an important highway from New York to Lake Champlain and then northward to Montreal. Its tributary, the Mohawk, opens out a route westwards to Lake Ontario. The Delaware flows into Delaware Bay, an estuary which has been formed by the partial submergence of the valley. The Susquehanna and the Potomac form valuable gaps across the Appalachians, then flow across the coastal plain to the partially submerged estuary of Chesapeake Bay.

From the point of view of relief six regions may be distinguished, viz. :—

(1) The Hudson-Mohawk lowland.

(2) The coastal plain of New Jersey, with its continuation in Long Island.

(3) The Appalachians, a complex mountain system running through the middle of Pennsylvania.

(4) The Catskill Mountains in the angle between the river Mohawk and the lower Hudson.

(5) The Adirondacks in the middle of the triangle formed by the rivers St. Lawrence, Mohawk, and upper Hudson.

(6) The plain on the southern shore of Lake Ontario.

2.—**Routes, Towns, and Industries.**

New York, which has now a population of more than $5\frac{1}{2}$ millions, is situated at the mouth of the Hudson river. Brooklyn, a part of New York, is situated on the western end of Long Island. Jersey City, a part of Greater New York, is situated on the right bank of the Hudson. The city owes its pre-eminence to the following factors :—

(*a*) It is situated on an excellent harbour, protected by Long Island.

(*b*) It controls the route to the interior via the Hudson-Mohawk valleys.

(c) It has become the terminus of all the great railways of U.S.A.

Pittsburg, in eastern Pennsylvania, is the greatest American centre of the iron and steel industry. It is on the most important coalfield of U.S.A., large quantities of petroleum and natural gas are obtained in the region, and formerly much iron ore was

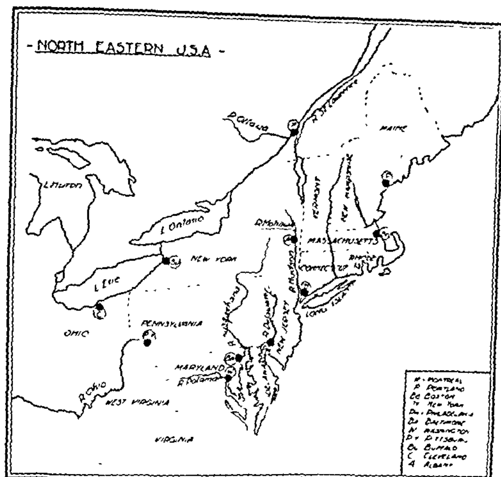


Fig. 56

mined there. Nowadays, however, most of the ore is brought from the region round the western and southern shores of Lake Superior

The city is situated where the rivers Allegheny and Monongahela unite to form the Ohio. These streams were formerly of great importance in the economic development of the region In modern times they have been largely supplanted as a means of communication by the railways which follow their valleys From Pittsburg the head-streams of the Potomac and the Susquehanna form routes to the Atlantic coast.

Philadelphia is situated on the river Delaware. It is the third port of U.S.A., and is the natural outlet for the iron and steel goods of the Pittsburg region. It has important textile and engineering works.

Buffalo is situated at the north-eastern end of Lake Erie. It is therefore the port for the transhipment of goods from the waterway of the Great Lakes to the land routes to New York, Pittsburg, etc. Its chief trade is in coal from Pennsylvania, iron ore from the Superior district, and grain from the prairies. Being situated at the meeting of the streams of coal, iron, and grain, and also being supplied with cheap electrical power from Niagara, it has become one of the chief manufacturing cities of U.S.A. Its chief industries are flour-milling, and the manufacture of iron and steel goods.

Albany occupies a commanding position at the confluence of the Hudson and the Mohawk, and is consequently an important railway centre. It is also at the tidal limit of the Hudson.

Rochester is a port on the southern shore of Lake Ontario. It possesses similar advantages to Buffalo, except that it is not on the main stream of the traffic in coal and iron. It is a flour-milling centre, is a great market for fruit and vegetables, and has many miscellaneous industries, particularly noteworthy being the manufacture of boots and shoes.

On the lowland between Albany and the shore of Lake Ontario are a great many manufacturing towns which specialise in some particular industry, e.g. shirts at Troy, cotton goods at Utica, electrical apparatus at Schenectady.

III.—THE SOUTH ATLANTIC STATES

These include all the States south of Delaware Bay which front on the Atlantic, as well as West Virginia which is an inland State.

1.—**Physical Features.** Five roughly parallel belts of country may be distinguished, viz. :—

(*a*) *The Coastal Region.* North of Cape Hatteras the coast has, in comparatively recent geological times, been partially submerged. In consequence of this the outline of the coast is very irregular, and there are many branching inlets reaching far into the interior, the most noteworthy being Delaware Bay and Chesapeake Bay. South of Cape Hatteras the coast has been elevated, consequently it is comparatively straight, with few large indentations.

The coastal plain, which has an average width of about 150 miles in the south, narrows towards the north-east, and entirely disappears beyond New York.

The peninsula of Florida is really an extension of this coastal plain, most of the land being low-lying and water-logged.

(b) *The Piedmont Belt.*—This is a region of hard rock which stands out at the foot of the Appalachians, above the coastal plain. Where the rivers of the Atlantic States—e.g. the Potomac, the James, the Roanoke, and the Savannah—cross the line between the Piedmont Belt and the coastal plain, waterfalls and rapids occur. This line is therefore known as the Fall Line.

(c) *The Blue Ridge.*—This is the front range of the Appalachian Mountains, and is found to the east of the Piedmont Belt. Its height increases to the south-west, Mount Mitchell in North Carolina being 6700 feet high.

(d) *The Great Appalachian Valley.*—This is a long depression in the middle of the mountain belt, occupied in its southern part by the Tennessee river, and in the north by the headwaters of various tributaries of the Ohio.

(e) *The Allegheny Plateau.*—West of the Great Valley the land rises steeply to a mountainous ridge known as the Allegheny Mountains. Westward of this ridge the land slopes gradually to the Mississippi basin. This westward-sloping plateau region is known as the Allegheny Plateau.

2.—**Climate.** As the South Atlantic States range between latitudes 40° N. and the Tropic of Capricorn, and from sea-level to over 6000 feet, there are considerable variations of climate within the region. In the north the 32° F. isotherm for January crosses the head of Chesapeake Bay, thus indicating that this area has considerably colder winters than the British Isles although it is more than 10 degrees nearer the Equator. The reason is to be traced to the cold winds which blow from the interior at this season. In summer, however, the same region has a sea-level temperature of about 74° F. (10 degrees higher than that of Britain).

Florida, which stretches almost to the Tropic, has a remarkably equable climate, having an average temperature of about 64° F. in January and about 80° F. in July. The whole region of the Atlantic States has rain at all seasons, though Florida has a well-marked summer maximum.

3.—**Cultivation.**

(a) *Tobacco.*—The chief tobacco-growing States are Virginia, West Virginia, and the eastern parts of Kentucky and Tennessee. The plant requires a fairly warm, moist climate and fertile soil, but probably the most important factor necessary for success is skilful cultivation and subsequent preparation of the leaf. Richmond, in the State of Virginia, is the chief market for the product.

(b) *Cotton* is widely cultivated in Georgia and the Carolinas.

The cultivation of this crop is dealt with on page 234 under the heading of the Cotton Belt.

(c) *Fruit.*—In the Appalachian region large quantities of fruits are raised, apples and pears being typical of the northern regions, grapes and peaches of the southern regions.

Florida, which has a climate practically free from frost and drought, specialises in the cultivation of oranges, lemons, grapefruit, limes, and pineapples.

(d) *Arable Farming.*—On the fertile portions of the coastal plain, and in the sheltered valleys of the Appalachians, maize is widely cultivated. Wheat and oats are cultivated chiefly in the Appalachian valleys.

There is also a considerable dairying industry.

4.—**Minerals.** The Appalachian coalfield extends through West Virginia, and coal is mined in the region between the headwaters of the Ohio and the James river. Oil is also obtained in the same State. Iron is mined near the western boundary of Virginia. Florida produces more than two-thirds of the mineral phosphate mined in U.S.A. It is used as a fertiliser, and partly accounts for the great productivity of the fruit lands of Florida. Some phosphates are also mined in South Carolina, near Charleston.

5.—**Town Sites.** Two lines of towns may be noted in this region, viz.: (1) The towns on the Fall Line, and (2) The seaports.

The Fall Line marks the limit of navigation on the rivers, and is the junction of the highland and lowland regions. Moreover, power is available from the falls. Consequently many important towns have grown up on this line, e.g. :—

(*a*) Augusta, on the Savannah river, which marks the boundary between Georgia and South Carolina. Here cotton goods are manufactured.

(*b*) Columbia, in South Carolina, also manufactures cotton goods.

(*c*) Raleigh, on the river Meuse, specialises in the manufacture of iron goods and tobacco.

(*d*) Richmond, on the river James, has already been mentioned as the chief centre of the tobacco industry. It also manufactures iron goods, and has many flour mills.

At Washington the Fall Line and the line of seaports converge ; therefore the chief towns to the north-east of this point have the double advantage of being on the Fall Line and also on the coastline. They are dealt with in a succeeding paragraph.

The chief seaports in the southern part of the region are Savannah and Charleston, both important cotton-exporting towns. Jacksonville is the port for northern Florida ; it is also a famous winter holiday resort. Newport News, in Virginia, at the

mouth of the James river, exports much of the coal from West Virginia.

Baltimore, the seventh city in size in U.S.A., stands at the head of Chesapeake Bay. Besides having excellent facilities for shipping it is the outlet for much of the produce of the Pittsburg area, and for the grain of the interior. Access to coal, iron, cotton, and wool have made it an important manufacturing city.

Washington, on the Potomac river, is the capital of U.S.A. Though it is admirably situated for an industrial city, with access to coal, iron, and raw materials, and with electrical power from neighbouring waterfalls, industrial development has been largely precluded by the activities associated with a great governing centre. The city was planned before it was established; consequently it is to-day one of the world's most beautiful cities.

IV.—THE MISSISSIPPI BASIN

The area drained by the Mississippi and its tributaries includes practically all the land between the Great Lakes on the north, the Appalachians on the east, the Rockies on the west, and the Gulf of Mexico on the south. From a physical point of view the region may be divided into four divisions, viz.: The Great Plains on the east of the Rockies, the Central Valley of the Mississippi, the Great Lakes region, and the Gulf Plain. From an economic point of view the Great Plains correspond approximately to the ranching and stock-raising area; the Central Valley may be divided into the wheat belt in the north, the maize belt in the centre, and the cotton belt in the south; the Great Lakes region is concerned chiefly with iron-mining, manufactures, and commerce; the coast-lands of the Gulf of Mexico are characterised by the cultivation of rice and sugar. These economic divisions, however, considerably overlap each other in many cases; it will consequently be more convenient to describe the various types of economic activity in the region as a whole.

1.—**Wheat.** The chief wheat lands of U.S.A. are a continuation of those of Canada. They embrace the State of Minnesota, and the eastern parts of North Dakota, South Dakota, Nebraska, and Kansas; they form a belt about 150 miles wide on the international boundary, 100 miles wide in the south, and about 1000 miles long. Here the conditions for successful cultivation are similar to those in Canada, viz. warm sunny summers, a rainfall of about 20 inches per annum, level ground, deep and fertile soil, and farms large enough to allow large-scale methods of cultivation. The chief markets for the wheat are Chicago, Minneapolis, Kansas City, and St. Louis.

2.—**Maize.** For successful cultivation maize requires warmer summers, and a greater summer rainfall than wheat. Consequently the maize belt is situated further south, and stretches further east than the wheat belt, though in the States of Kansas and Nebraska the two belts overlap. The chief maize-growing States are: Iowa, Illinois, Indiana, Ohio, eastern Nebraska, and Kansas.

The chief market for maize is Chicago, but by far the greater part of the crop is used for the fattening of animals.

3.—**Live-stock.** On the Great Plains the rainfall is less than 20 inches per annum in the east, and less than 15 inches near the foot of the Rockies. The region is, therefore, given up chiefly to the rearing of cattle and sheep on a large scale.

In the maize belt tremendous numbers of cattle and pigs are fattened for the markets at Chicago, Omaha, and Kansas. These cities are the centres of the meat-packing industry of U.S.A.

4.—**Tobacco.** On the western side of the Appalachians the chief tobacco-growing States are Kentucky and Tennessee. Conditions of cultivation are similar to those of Virginia. Louisville, on the Ohio, is a great centre of the industry.

5.—**Cotton.** The cotton belt of U.S.A. extends to the 35th parallel on the north, to the Atlantic coast on the east, to meridian 100° on the west, and to the coastal belt of the Gulf of Mexico on the south. It includes the States of Arkansas and Louisiana and the eastern halves of Texas and Oklahoma on the western side of the Mississippi; the States of Tennessee, Alabama, Mississippi, Georgia, North and South Carolina to the east of the Mississippi.

Cotton requires, for successful cultivation, hot summers, with abundant, though not excessive rainfall, and a fertile soil consisting of clay and sand with an admixture of lime. Western Texas receives less than 20 inches of rainfall, and is thus unsuitable for cotton; the swampy coast-lands of the Gulf of Mexico receive over 60 inches of rain, which is too much for the cultivation of cotton. The whole of the cotton belt lies south of the 40° F. isotherm for January, and south of the 80° F. isotherm for July.

The chief producing areas are: eastern Texas, the valley of the Mississippi, and central Alabama. On the coast-lands of the Carolinas the "sea-island" cotton, famous for its long, strong and silky fibre, is cultivated.

The ports engaged in shipping the raw cotton are: Galveston in Texas, New Orleans at the mouth of the Mississippi, Mobile at the mouth of the Alabama river, Savannah and Charleston on the Atlantic coast. One quarter of the total crop is shipped

to Great Britain, while Germany, France, Japan and Italy also import large quantities.

6.—**Rice and Sugar Cane.** These crops require abundant water, and a high temperature. These conditions are fulfilled on the swampy coast-lands of Texas, Louisiana, and Mississippi.

7.—**Iron-Mining.** The chief iron-mining district of U.S.A. is situated near the western and southern shores of Lake Superior. Most of the ore is shipped at the ports of Duluth, Ashland, and Marquette, and sent by the Great Lakes to the iron and steel manufacturing district of Pittsburg.

Iron ore also occurs on the western side of the Appalachians. In Pennsylvania the ore is largely worked out, but at the southern end of the mountains, near Birmingham, in central Alabama, much iron is mined and smelted.

8.—**Coal.** The chief coalfields of U.S.A. are:—

(*a*) The Appalachian coalfield, which stretches along the western side of the Appalachian System from northern Pennsylvania to central Alabama. The chief producing centres are the Pittsburg region, west Virginia, and central Alabama, though much coal is also raised in the States of Ohio and Kentucky.

(*b*) The Central Coalfield in Illinois and Indiana.

(*c*) The South-Western Coalfield of Arkansas, Oklahoma, and Texas.

(*d*) The West-Central Coalfield of Nebraska and Iowa. All the above fall within the region under discussion.

9.—**Petroleum.** U.S.A. produces more than two-thirds of the world's supply of petroleum. The chief oilfields in the Mississippi basin are:—

(*a*) The Appalachian field, stretching through Pennsylvania, West Virginia, Kentucky, and Tennessee. This field is almost exhausted.

(*b*) Illinois and Indiana fields; these have also ceased to produce very large quantities.

(*c*) Oklahoma and Texas; this region produces nearly two-thirds of the oil in U.S.A. Much of it is shipped to Europe, via the port of Galveston.

10.—**Towns, Routes, and Industries.**

Chicago, with a population of 2,700,000, is the second city of U.S.A. It is situated at the southern end of Lake Michigan, where a little creek formed the basis for the modern docks. It is the market for the great wheat and maize producing regions of the central States, and is the greatest meat-packing centre in the world. It has easy access to coal, oil, and iron, and has therefore become a great manufacturing city. By virtue of its position it has become the centre of great railway routes diverging to east,

west, and south. The student should trace out the following routes on the printed map and draw them on a sketch-map :—

(*a*) North-eastward via Detroit and Lake St. Clair to Hamilton, Toronto, and Montreal.

(*b*) Eastward, via the southern shore of Lake Erie to Cleveland, thence to Pittsburg and across the Appalachians to Baltimore, Philadelphia, and New York.

(*c*) South-eastward, via Indianapolis and Cincinnati and across the Appalachians to Richmond.

(*d*) Southward by the Mississippi valley, through Cairo and Memphis to New Orleans.

(*e*) South-westward to Kansas City, whence routes diverge to the western coast.

(*f*) Westward to Omaha, and thence by the Union Pacific route across the Rockies.

(*g*) North-westward, via Minneapolis, St. Paul, and thence by the Northern Pacific route to Portland on the west coast.

(*h*) North-westward through St. Paul to Winnipeg.

Detroit is situated on the narrow isthmus between Lake Erie and Lake Huron. It is therefore at the crossing-place of two great routes, viz.: (*a*) The waterway along the Great Lakes; (*b*) The land route from the lake region of U.S.A. to the Lake Peninsula of Canada. It has become a great centre of the motor-car industry.

Cleveland is situated on the southern shore of Lake Erie, at the nearest point to Pittsburg. It has thus become the port at which iron ore from Lake Superior is put on rail for the Pittsburg manufacturing area. Having easy access to both coal and iron it has become an important iron and steel manufacturing centre. Petroleum and natural gas are found nearby.

Minneapolis–St. Paul.—This is a twin city, which has grown up at the limit of navigation of the Mississippi. It is, therefore, an important route-centre, railways diverging from it to Chicago, St. Louis, Kansas City, Omaha, and across the Rockies by the Northern Pacific route. Being in the centre of the wheat-lands it has developed a large flour-milling industry.

Duluth, at the western end of Lake Superior, is the terminus of the Great Lakes waterway, and the focus of land routes from the west and south. Its chief trade is concerned with the shipment of wheat and iron ore. Some coal is imported from Pennsylvania, and an iron industry has developed, the manufacture of agricultural implements being specially important.

Milwaukee is situated on the western shore of Lake Michigan. It is, therefore, somewhat aside from the main east-to-west routes of U.S.A., and so has not developed as quickly as

Chicago. It manufactures agricultural machinery, and has large flour mills.

St. Louis originally grew up as a fur-trading station, at the confluence of the Missouri and the Mississippi. Later it became the natural objective of the railway routes from the east, north-east, and south-east, while to the west of it routes diverge in all directions across the Great Plains. It is a great market for horses, cattle and sheep, and is an important meat-packing centre, and is also a centre of the tobacco industry. Its population numbers 772,000.

Cincinatti is situated on the navigable Ohio, and is the centre of railway routes which radiate to Chicago, Cleveland, Pittsburg, the Atlantic and Gulf coasts, Cairo and St. Louis. Its industrial activities are concerned chiefly with meat-packing, the manufacture of leather goods, soap, and tobacco.

Louisville is also situated on the Ohio, but, as it has not become so great a route-centre as Cincinatti, it has not grown so rapidly, its population being little more than half that of the former city. Its chief industries are meat-packing, the preparation of tobacco, and the manufacture of agricultural implements.

Cairo, situated at the confluence of the Ohio and the Mississippi, has a position analogous to that of St. Louis. It is, however, only a small town with a population less than 50,000, i e. only one-fifteenth the size of St. Louis. The reason is to be traced, in great part, to the fact that Cairo has not become an important centre of railway routes.

Kansas City is an important route-centre at the confluence of the Missouri and the Kansas river From it important trans-continental routes diverge via St. Louis on the east, and the valleys of the Missouri and the Kansas on the west. The city is also the meeting-point for railways from all parts of the Great Plains and the Mississippi valley. The chief industrial activities of the city are concerned with meat and timber.

Omaha holds a similar position at the confluence of the Platte river and the Missouri, and is also a meat-packing centre.

New Orleans is situated on the river Mississippi about 150 miles from its outfall. It is thus the natural outlet for the produce of the Mississippi basin. Here, too, the coastal route from New York crosses the river, and is continued westward by the Southern Pacific Railway to San Francisco. The trade of the port consists chiefly in the export of raw cotton, though much timber is also exported. Other cotton-exporting towns on the Gulf coast are Galveston and Mobile.

V.—THE CORDILLERAN REGION

The Cordilleran region is a complex area formed of many mountain ranges enclosing "inter-montane" plateaux and basins. The following natural regions will be considered :—

(1) The Rockies.
(2) The Columbia-Snake Basin.
(2) The Great Basin.
(4) The Colorado Plateau.
(5) California.

1.—**The Rockies.** The eastern range of the Cordillera is known by the general name of the Rockies; but different portions have distinctive names. Some of the most important of these subdivisions of the Rockies are: the Elk Mountains in Montana, the Big Horn Mountains in northern Wyoming, the Laramie Mountains in southern Montana, and the Colorado range in Colorado. The last-named range contains some of the highest peaks in North America, e.g. Pike's Peak, which is 14,150 feet above sea-level.

Though the Rockies form, in a general way, the watershed between the Pacific rivers and the Mississippi basin, yet it should be noted on the map that many of the tributaries of the Mississippi rise on the western side of the main ranges, thus forming valuable water-gaps, e.g. the Missouri and the Yellowstone rivers in Montana, the North Platte river in Wyoming, and the Arkansas river in Colorado.

The economic importance of the Rocky Mountains region centres around three features, viz. :—

(*a*) The inter-montane basins, or high plateaux ringed around by mountains. Most noteworthy of these are: North Park, drained by the North Platte river; Middle Park, drained by the Grand river of Colorado; and South Park, drained by the South Platte. These parks are useful for ranching.

(*b*) The passes used by the railways. The chief are: the valleys of the Missouri and the Yellowstone (used by the North Pacific Railway), Evans Pass on the southern boundary of Wyoming (used by the Union Pacific Railway which runs from Cheyenne via Ogden to San Francisco), the valley of the upper Arkansas river used by another branch of the Union Pacific system from Pueblo to Salt Lake City, and the valley of the Rio Grande used by the Southern Pacific Railway from New Orleans, via El Paso to Los Angeles and San Francisco.

(*c*) Mineral wealth is abundant along the whole length of the Rocky Mountain belt. Coal occurs in scattered basins in many parts, notably around Denver, but on account of the distance

from industrial centres, and the difficulty of transport, very little is mined. Iron occurs in the Pike's Peak district. Gold, silver, lead, and zinc are mined in Colorado.

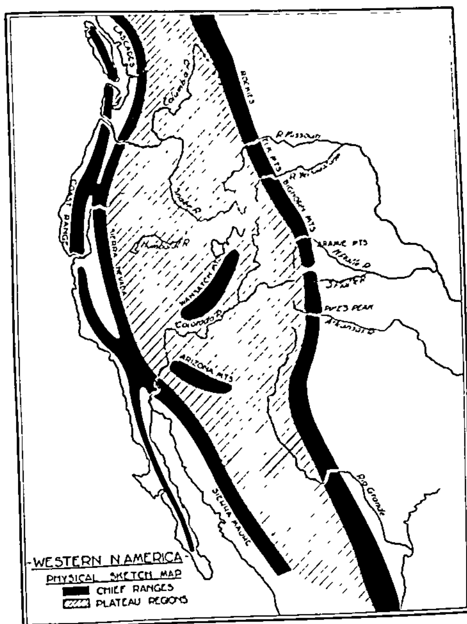


Fig. 57

The junction between the front range of the Rockies and the High Plains to the east is marked by a line of towns which have grown up where gaps lead through the highlands. Denver is the most important of these. Originally a mining camp, it has

developed into a city with a quarter of a million inhabitants. It is still the centre for the mining region around, and is also an important railway centre. Other important towns, which owe their development to similar factors, are Cheyenne, Pueblo, and El Paso.

2.—**The Columbia-Snake Basin.** This region corresponds approximately to the States of Washington, Oregon, and Idaho, with the addition of the western portion of Montana. The greater part of the area is a plateau enclosed between the Cascade Mountains on the west and the Rocky Mountains on the east. The rocks of this plateau consist chiefly of lava, which was poured out on the surface in a molten condition.

The climate of the plateau portion is characterised by aridity, due to the sheltering mountain ranges, and extremes of temperature, due to the aridity and the distance from the sea. The rainfall is generally too scanty for successful agriculture, but where irrigation is possible good crops of wheat and fruit are obtained. The chief economic importance of the plateau region depends on its mineral wealth.

Butte, in Montana, is an important mining centre, copper, zinc, and silver being obtained in the surrounding district.

Spokane, on the Columbia river, is at the junction of railway routes, in the centre of an irrigated district and an important lead-mining district.

The coastal region of Washington and Oregon consists of the following physical divisions: (*a*) a narrow coastal plain; (*b*) the coast range; (*c*) a broad valley running southward from Puget Sound; (*d*) the Cascade Mountains; (*e*) the lower course of the Columbia-Snake river. The first four of these are north to south belts parallel to the coast; the last runs across them from east to west.

The chief industries of the coastal region are lumbering, fruit-farming, and salmon-fishing.

Seattle, is an important port, situated on Puget Sound. It is the terminus of a trans-continental railway. The chief exports are timber and wheat. It imports gold and copper from Alaska.

Portland is situated in the central valley some 100 miles from the coast. It is the head of ocean navigation on the river, and the terminus of a trans-continental railway. Its trade is naturally with the East.

3.—**The Great Basin.** This region includes the State of Nevada and the western half of Utah. It is bounded on the north by the divide between the Snake river and the Humboldt river; on the east and south by the Wahsatch range, and on the west by the Sierra Nevada. Near the foot of the Wahsatch range is Great Salt Lake, which has no outlet. The Humboldt and other streams in the basin also end in salt lakes. These facts point to

an arid climate, with rainfall insufficient for agriculture. Irrigation is, however, carried on from streams flowing from the surrounding mountains. Some stock-raising is possible on the unirrigated parts of the plateau.

The chief towns are Ogden and Salt Lake City. Silver, copper, and gold are mined in the mountain regions around the plateau.

4.—**The Colorado Plateau.** The plateau lies between the Wahsatch Mountains on the north-west, the Rockies on the east, and the Arizona Highlands. The surface is dissected by the valleys of the Green river and the Grand river, which unite to form the Colorado river. This river has cut down its valley through the almost horizontal rock layers, to form a canyon more than a mile deep.

The average annual rainfall is less than 8 inches, while the average July temperature approaches 90° F. These two factors combine to make the plateau a desert region of practically no economic importance. There is, so far as at present ascertained, very little mineral wealth in the region.

5.—**California.**

Physical Features.—From a physical point of view California corresponds very closely to the coastal region of Washington and Oregon. It consists of four parallel belts of lands, viz. :—

(*a*) A very narrow coastal region.

(*b*) The Coast Range, rising steeply from the coast.

(*c*) The Great Valley, drained by the river Sacramento flowing from the north, and the San Joaquin flowing from the south. These two streams unite in the centre of the state and flow to the sea through a gap in the Coast Range at San Francisco

(*d*) The Sierra Nevada range.

Climate.—California has a Mediterranean type of climate (see page 215). The coastal region has an exceptionally equable climate, San Francisco having an average temperature of 58° F in July, and 50° in January. Inland, however, the climate becomes both more extreme and more arid Thus, Fresno, in the southern part of the Central Valley, has a January average of 46° F., and a July average of 82° F, while its rainfall is only 10 inches. In the north of the Central Valley, however, the rainfall is higher, averaging about 25 inches per year

Farming.—Fruit-farming is the chief industry of California The state produces about three-quarters of all the grapes, plums prunes, oranges, and lemons of U.S A , as well as large quantities of peaches, apples, pears, etc

Wheat is another important crop, though its production has declined in recent years. Tobacco and rice are also cultivated to a small extent. The lower slopes of the mountains are utilised for cattle-ranching.

Timber.—Valuable forests of red-wood and cedar exist on the Coast Range and the northern portions of the Sierra Nevada.

Mining.—The early development of California was due to the discovery of gold. The state still produces great quantities of the precious metal, chiefly from the northern part of the Sierra Nevada range.

Oil.—California produces about one quarter of the petroleum obtained in U.S.A. The chief sources of supply are in the San Joaquin valley.

Routes and Towns.—San Francisco, situated on the wonderful harbour known as the Golden Gate, is the centre of railways and commerce. The chief routes focussing on the city are :—

(*a*) The Southern Pacific, which approaches California via the Humboldt river.

(*b*) The Southern Pacific line from El Paso, which approaches California via the southern portion of the Great Valley.

(*c*) The coastal route from Mexico via Los Angeles.

(*d*) The line from Portland, down the San Joaquin valley.

The city has thus become the commercial centre for the whole of western America. Its chief trade is with the Orient, although the opening of the Panama Canal has enabled it to compete in European trade.

Los Angeles, with a population of about 580,000, is a slightly larger city than San Francisco. It is known the world over as the centre of the film industry, but it is also an important industrial and commercial centre. Its industrial development is based mainly on the local supplies of petroleum. Its commerce is conducted through the port of San Pedro.

Sacramento is the centre of the fruit region of central California. It is, however, completely overshadowed in importance by San Francisco; its population is only 66,000.

San Diego, almost on the Mexican boundary, has the only good harbour south of San Francisco. It is, however, too far south to have much share in the commerce of California.

VI.—ALASKA

This vast peninsula in the extreme north-west of America was purchased by U.S.A. from Russia in 1867 for the sum of one and a half million pounds. Southern Alaska extends as a coastal strip—a "pan-handle"—as far south as latitude 55° N. Physically, the peninsula consists of four divisions, viz. :—

(*a*) The southern mountains, including the Alaskan range and the coastal belt of mountains and islands.

(*b*) The basin of the Yukon river.

(c) The northern or Romanzof Mountains.

(d) The northern coastal plain.

The climate is very cold in winter, the sea-lével temperatures ranging from 32° F. on the south coast to 24° F. on the north coast.

The summers are, however, very sunny and fairly warm, sea-level temperatures ranging from 40° F. in the north to 56° F. in the south, though temperatures as high as 100° F. have been recorded in the Yukon basin.

The chief industries are hunting and trapping fur-bearing animals, fishing, whaling and sealing, lumbering, and mining for gold and copper. The chief centres of population are Nome, Circle City, Fairbanks, and Juneau, the capital.

VII.—GREENLAND

This northern island is under the government of Denmark.

The interior is covered with a permanent ice-cap, through which the higher mountains show their bare, rocky summits.

The population, which is very scanty, is confined to the coastal strips. Most of the inhabitants are Eskimos, who live by hunting and fishing. Some aluminium ore and a little graphite are mined, but apart from these the peninsula is of little economic importance.

VIII.—MEXICO

1.—**Physical Survey.** From a physical point of view Mexico consists of the following regions:—

(1) The Eastern Coastal Plain.
(2) The Eastern Sierra Madre.
(3) The Central Plateau.
(4) The Western Sierra Madre.
(5) The Western Coastal Plain.
(6) The Isthmus of Tehuantepec in the south.
(7) The low peninsula of Yucatan.

Of these divisions all except the central plateau, which is rather arid at all seasons, have abundant summer rainfall. Consequently the natural vegetation of the plateau is semi-desert and poor grassland, while the other divisions are covered with various types of tropical forest.

The temperature is high at all seasons. The plateau has a sea-level temperature of 88° F. in summer, but the great height of the land (over 6000 feet) reduces this average to about 67° F.

The moderate temperatures, coupled with the dryness of the atmosphere, make the plateau the healthiest part of Mexico.

The coastal plains, with their hot, steamy atmosphere, are unhealthy. Consequently, the highest density of population is found on the plateau. Here the chief occupations are ranching and agriculture. The latter is carried on by the aid of irrigation, the chief crops cultivated being wheat, maize, beans, and fruit. On the moist lowlands rice, sugar-cane, and bananas are cultivated. Sisal-hemp is cultivated in Yucatan.

Mining is an important industry in Mexico. On the plateau silver, gold, copper, and iron are obtained, the first named in large quantities. *Mexico provides one-fifth* of the world's supply of petroleum. The chief oilfield is situated near Tampico on the east coast.

2.—**Routes and Towns.** The following routes should be traced on the map, and related to the physical features :—

(1) Along the eastern coastal plain from Vera Cruz, through Tampico, to link up beyond the Rio Grande del Norte, with the southern Pacific system of U.S.A.

(2) From Vera Cruz, the chief port, across the eastern range of mountains to Puebla and Mexico City, the capital, whence the line proceeds to the west coast at Manzanilla.

(3) Along the western coastal plain, to link up with the southern Pacific system in Arizona.

(4) Along the middle of the plateau through Puebla and Mexico City to El Paso on the U.S.A. frontier.

(5) The Tehuantepec Railway, from Puerto Mexico on the Gulf Coast, to Salina Cruz on the Pacific. This forms the shortest trans-continental line of North America.

IX.—THE WEST INDIES

1.—The West Indies consist of three groups of islands lying between Florida, Central America, and the north coast of South America, and enclose between them the Caribbean Sea. They are usually divided into groups, viz. :—

(1) The Greater Antilles, consisting of the four large islands of Cuba, Haiti, Jamaica, and Porto Rico.

(2) The Bahamas, lying between Florida and the Greater Antilles.

(3) The Lesser Antilles, which are subdivided into the Leeward Islands in the north and the Windward Islands in the south.

2.—**Climate.** All these islands are situated within the Tropics and in the belt of North-East Trades. The climate is hot at all seasons, but the heat is moderated to some extent by the sea-breezes, and in the Greater Antilles by the mountains which form a backbone running through the islands.

As the Trade Winds blow from the sea, they bring abundant rain, which is heaviest in summer. The western sides of the larger islands are somewhat sheltered from the rain-bearing winds, and consequently receive less rainfall. The natural vegetation is chiefly tropical forest, though scrub and grasslands are found on the drier western sides of the Greater Antilles.

3.—Economic Geography.

Cuba.—The chief products are cane-sugar, tobacco, and fruit. Iron, copper, and manganese ores are mined.

Havana, the capital, is situated on the northern coast. It has a fine harbour, and is world-famed for its cigars.

Haiti.—This island, which is also named *Hispaniola*, is divided between the two republics of Haiti in the west and Santo Domingo in the east. Both portions are of very little importance from an economic point of view, though some coffee and cocoa are exported. Maize, rice, and tobacco are also cultivated.

Port au Prince is the capital of Haiti, and Santo Domingo the capital of the republic of that name.

Jamaica.—This island is a British possession. It is rather densely populated, having an average of over 200 persons per square mile. The chief exports are cane-sugar, rum, bananas, and logwood. Kingston is the capital and chief port.

Porto Rico is governed by the United States, who have paid much attention to its economic development. Consequently it is densely populated and produces large quantities of cane-sugar, coffee, and tobacco. The capital is San Juan, situated on the north coast.

The Bahamas are a group of low-lying coral islands. Their chief export is fruit. The capital and chief port is Nassau.

The Leeward Islands are chiefly built up of coral and of volcanic material. Barbuda, Antigua, and Dominica belong to Britain, Guadeloupe and Martinique to France. The chief products are cane-sugar, pineapples, bananas, and limes.

The Windward Islands.—The chief islands, all of which belong to Britain, are St. Lucia, St. Vincent, and Grenada The products of economic importance are sugar and cocoa.

Barbados is a single island to the east of the Windward Islands It is intensively cultivated and densely populated. The chief crops are cane-sugar and cotton.

Trinidad belongs, physically, to South America, but is usually grouped with the West Indies. Its most notable product is pitch, which is dug from an apparently inexhaustible lake. Cocoa and sugar are also cultivated. The chief port is Port of Spain.

SECTION IV.—THE WORLD IN GENERAL, WITH SPECIAL REFERENCE TO THE BRITISH EMPIRE

Chapter XX

ASIA

1.—**Relief.** The following features should be noted on the physical map :—

(1) North-western Asia comprises a great plain lying between the Arctic Ocean on the north, the Urals and the Caspian Sea on the west, and, on the south-east, a line from the southern end of the Caspian Sea to Wrangel Island.

(2) The central belt of Asia is composed of a series of high mountain ranges, enclosing between them high plateaux and basins. Thus the plateau of Asia Minor is enclosed between the Pontic Mountains on the north and the Taurus Mountains on the south ; the plateau of Iran lies between the Elburz and the Zagros ; Tibet is enclosed by the Kwen Lun on the north and the Himalayas on the south ; the desert of Gobi or Shamo is ringed round by the Tien-shan, the Yablonoi, and the Khingan Mountains.

The Pamir plateau, to the north-west of India, is a " knot " where many mountain ranges meet (their names should be learnt from the Atlas map).

In south-eastern Asia, the mountain ranges run southward, forming the peninsulas of Burmah, Malay, and Annam.

(3) Southern Asia is composed of two great plateaux—Arabia and India, which are separated from the central mountains by Mesopotamia and the Indo-Gangetic plain respectively.

(4) Eastern Asia is composed of a series of islands and peninsulas which cut off between them and the mainland a series of semi-enclosed seas, e.g. the South China Sea, bounded by the Malay Peninsula, Borneo, and the Philippines ; the East China Sea, bounded by the Lu-chu Islands and Korea.

2.—**Rivers.** The courses of the chief rivers should be learnt by the student from the Atlas map. He should practise writing descriptions of their courses on the pattern of earlier sections of this book).

3.—**Temperature.** From the map in the Atlas showing the summer and winter isotherms the student should verify the following statements:—

(1) North-eastern Siberia has the lowest average winter temperature in the world (see −48° F. isotherm). *The cause of the intense winter cold is partly the high latitude and partly the great distance from the moderating westerly winds of the Atlantic.*

(2) Eastern Asia, *down to the tropic of Cancer, has winters much colder than their latitude warrants; the cause is the prevalence of cold winds from the cold interior.*

(3) The whole of Asia north of about latitude 35° N. is below freezing point in January (note the course of the 32° F. isotherm). The reason is that the great land mass cools quickly in winter, and is at the same time deprived by the mountains of the moderat*ing influence of warm winds from the ocean.*

(4) In July even the northern coast of Asia is comparatively warm (*over* 48° F.).

(5) Central Asia at *this season is very hot, the sea-level* temperature being over 80° F. It must be remembered, however, that the actual average temperatures are much less than this, on account of the height of the land.

(6) Southern Asia, including India, Further India, and the East Indies, are hot at all seasons. The islands about the Equator *have a remarkably equable climate; Ceylon, for example,* is crossed by the 80° F. isotherm in both January and July

4.—**Rainfall.**

(1) *The annual rainfall map shows three regions of very low* rainfall, viz.: northern Siberia, the basins and plateaux of Central Asia, and the plateaux of Arabia and Iran.

(2) The whole of south-eastern Asia, including India, Further India, China, Japan, and the East Indies, have heavy rainfall

(3) Around the shores of the Mediterranean, Asia Minor and Palestine *have moderately heavy rainfall.* The seasonal rainfall map (see Fig. 58) shows that in the winter half of the year the only regions with heavy *rainfall are the equatorial islands (the* Philippines, *Borneo,* the East Indies, and Ceylon), Japan, and the Mediterranean region. *Moderate rainfall is experienced by* China, Mesopotamia, and the Himalayan region. In summer very heavy rainfall is experienced in the whole of south-eastern Asia and in Japan. The central portion of the Siberian plain receives moderate rainfall in this season

5.—**Climatic Divisions.** *Combining the information derived* from the Atlas coloured vegetation map, the seasonal rainfall map (see Fig. 58), and the map in *the Atlas showing temperatures and*

annual rainfall, we find that Asia may be divided into nine climatic divisions, viz. :—

(*a*) *The Tundra Region*, which is strictly comparable to the similar regions in North America and the extreme north of Europe.

(*b*) *The Siberian Forest.*—This is a coniferous forest area, comparable to the coniferous forest region of Russia and Sweden and the northern forest region of Canada. The climate is one of great extremes; the rainfall is rather low, but as most of the winter precipitation is in the form of snow, and the greater part of the rainfall comes in summer, the total moisture available during the spring and summer months is adequate for the growth of trees. The chief economic activities in the region are lumbering, mining, and fishing. Timber is abundant, but the quality is variable, and the difficulty of communication has prevented the development of a great lumbering industry. Mining is most important in the eastern part of the area, particularly in the valleys of the Lena and the Upper Tunguska. Gold is the chief mineral produced. The rivers provide fish for export.

It should be noted that the southern part of this region is south of the northern limit for the cultivation of cereals. Wheat cannot be successfully cultivated, but oats, barley, and rye are grown in the clearings. The total amount is not, however, sufficient for the needs of even the sparse population of the region.

(*c*) *The Temperate Grass-lands.*—This region, which extends as a gradually narrowing belt eastward from the Black Sea to the south of Lake Baikal, merges on the north into the coniferous forest area and on the south into the poor steppes and semi-desert. Climatic conditions are similar to those of the North American prairies (cold winters, hot summers, and low rainfall which falls chiefly in summer). The soil is deep and fertile, hence this region is suitable for the cultivation of wheat. It has not yet been developed on a large scale, but it forms one of the world's potential granaries.

The Trans-Siberian Railway marks the approximate dividing line between the northern forest and the central grass-lands. It crosses the river Irtish (a tributary of the Ob) at Omsk; the Ob itself is crossed some distance south of Tomsk. Krasnoyarsk marks the crossing-place of the Yenisei. Irkutsk is situated near the southern end of Lake Baikal, on the river Angara, which joins the Yenisei at Yeniseisk. From Irkutsk the railway winds around the southern end of Lake Baikal, then round the northern end of the Yablonoi Mountains to Chita. Here a line runs southward to Harbin in Manchuria, where routes branch off to Vladivostok on the Sea of Japan, and Port Arthur on a peninsula jutting out into the Yellow Sea. The more northerly line continues

eastward parallel to the course of the Amur, to its *terminus* at Vladivostok.

(*d*) *The* ... he chief areas under ... the Sea of Aral, the T ... and the Iran plateau. ... are all characterised by low rainfall, great range of temperature, scanty *vegetation*, and a sparse population of nomadic tribes.

The Kirghiz Steppes are inhabited by the Kirghiz nomads, who get a living by wandering about with *flocks* and *herds*. In the western part of the region their favourite animal is the *horse*, but in the eastern part they use the yak, both as a *beast of burden* and as the source of all the necessaries of life.

In Turkestan, and on the plateau of Iran, *cultivation is carried* on in specially favoured districts by means of irrigation, particularly from the rivers Amu Daria, Syr Daria, and Helmand. Cotton, wheat, and fruit are the chief crops cultivated.

The Shamo region is chiefly a desert area, of practically no ... by nomadic Arab ... nexplored, but is known to be one of the most forbidding desert regions in the world. In the northern and central portions are scattered oases which are linked up by caravan routes Around these oases a scanty population subsists by the cultivation of dates and cereals, and by the tending of flocks of sheep and goats.

On ... more fa ... tion. These are:—

(i) The region round Jiddah and Mecca.

(ii) Yemen at the extreme south-western corner of the peninsula.

(iii) The Hadramut region around Makalla on the southern coast.

(iv) Oman, on the shore of the Gulf of Oman The chief town here is Muscat. The only railway is the "Pilgrim route" from Palestine to Medina. Mecca is the most sacred city of the Mohammedans, and thousands of pilgrims walk thither every year from either the railhead at Medina or the port of Jiddah

Aden is a British naval and coaling station, controlling the route to India.

(*f*) *Asia Minor, Syria, and Palestine*.—This area forms part of the Mediterranean region Climatically, therefore, it is characterised by winter rain and summer drought The interior of the plateau of Asia Minor, however, is so sheltered from the rain-

bearing winds that there are many basins where desert and semi-desert conditions obtain. On the coastal regions agriculture is the chief occupation. The Mediterranean fruits—olives, grapes, and figs—cotton, wheat, and maize are widely cultivated. On the plateau region flocks of sheep and goats are tended. The Angora goat, from which mohair is obtained, is the chief animal of economic importance on the plateau.

Smyrna, Beirut, and Jaffa are the chief ports. Of the inland towns Angora, Aleppo, and Damascus are the most important. The chief railway route in Asia Minor runs from Scutari, on the southern side of the Bosporus, across the plateau of Anatolia, through the Taurus Mountains by the Cicilian Gates, and down to Adana and Alexandretta, near the north-eastern angle of the Mediterranean. There are branches to Angora, the capital of Turkey, and to Smyrna, the chief port on the eastern shore of the Ægean.

From Aleppo the above route is continued eastward to the border of Mesopotamia, where it will eventually link up with the Bagdad Railway from Basra, through Bagdad to Mosul.

Southward from Aleppo a line runs through Syria to Damascus, through Transjordania to link up with the Pilgrim route to Mecca. Beirut, the chief port of Syria, is joined by railway to Damascus.

In Palestine a route runs from Akka (Acre) via Jerusalem to Gaza, and thence across the desert to Egypt.

(g) *Mesopotamia.*—This is the region drained by the rivers Euphrates and Tigris. It is part of the mandated territory of Iraq, which also includes a portion of the Arabian desert. The climate of Mesopotamia is midway between the desert type and the Mediterranean type. Its rainfall is small, but comes chiefly in winter. Formerly this region was one of the most fertile parts of the world, but the irrigation works on which the fertility depended were allowed to fall into decay. It is hoped, however, that fresh irrigation projects will be undertaken, and that in the future Mesopotamia will again become capable of producing large crops. At present the chief crops are wheat, barley and dates, but much of the region is occupied by semi-nomadic pastoral tribes.

Basra, at the confluence of the Tigris and the Euphrates and at the head of ocean navigation, is the chief port.

Bagdad and Mosul are centres of the inland trade with Persia, Asia Minor, Syria, and Palestine.

(h) *The Monsoon Lands.*—India, Indo-China, China, and Japan receive heavy rainfall in summer, when the south-west and south-east monsoons are blowing. These winds, which blow regularly from June to the middle of December, are due to the following causes:—

In summer the air about the tropic of Cancer becomes very

hot; it therefore rises, and air is drawn in from the Indian and Pacific Oceans to take its place. On account of the rotation of the earth these winds are deflected from a straight course, and over India they blow from the south-west and over China from the south-east. Coming from the sea, they are heavily charged with water vapour, consequently the period of south-west and south-east monsoons is very wet.

In winter the conditions are reversed. The temperature over Central Asia is very low, therefore the winds blow outward to the coast, appearing as the north-east monsoon over India, and the north-west monsoon over China. Coming from the land, these winds are dry; consequently winter is the dry season in the monsoon lands.

The economic geography of India, Burmah, China, and Japan is described below.

(i) *The Equatorial Islands*.—In the East Indies, the Malay Peninsula, and Ceylon, the climate is hot and wet at all seasons. The cause of the abundant rainfall is to be attributed partly to the great heat, which causes the air to rise and deposit moisture, and partly to the fact that, whichever of the above-mentioned monsoons is blowing, they reach these islands after having blown over great stretches of ocean. The natural vegetation is tropical forest, except on the mountains which form a backbone to each island; here grass-land takes the place of forest

Java, which belongs to Holland, is the most highly developed island in the equatorial regions. Rubber, coffee, cocoa, sugar, and sago are the chief exports The chief towns are Batavia, the capital, and Surabaya, the principal port

Sumatra has not received such careful attention as Java, and is as yet mainly undeveloped The products are similar to those of Java, but tin and coal are also mined.

The Philippines, which are governed by U S A, produce all the typical equatorial products—rice, coco-nuts, sugar cane, bananas, etc., but tobacco and hemp are the specialties. Manila is the capital and chief port.

Malaya.—This is the name given to several groups of settlements at the southern end of the Malay Peninsula These settlements are usually grouped as follows:—

(i) The Straits Settlements, which include Singapore and Malacca, on the Straits of Malacca

(ii) The Federated Malay States

(iii) The Unfederated Malay States.

The chief products are rubber, coco-nuts, rice, spices, and pineapples. Tin is mined in many parts of the peninsula, and Malaya provides about half the world's supply of this metal.

Singapore, on an island off the southern end of the Malay Peninsula, commands the most important cross-routes of the east. The student should trace the following trade routes on the map :—

(1) To Hong-Kong, Shanghai, and Yokohama.

(2) To Batavia, thence by Torres Strait to Brisbane, Sydney, and Melbourne.

(3) To Rangoon and Calcutta.

(4) To Colombo, Bombay, and via the Red Sea and Suez Canal to Europe.

(5) To South Africa.

It is, therefore, one of the most important trading centres and naval stations in the eastern seas.

INDIA

1.—**Physical Divisions.** The following divisions should be noted on the Atlas physical map :—

(1) The northern mountains including the Himalayas on the north, and the Sulaiman Mountains and the Hindu Kush on the west.

(2) The plain of the Indus. The northern portion of the basin, which is drained by the Indus and four of its tributaries—Jhelam, Chenab, Ravi, and Sutlej—is known as the Punjab (=land of the five rivers).

(3) The plain of the Ganges. Here the tributaries Jumna and Son on the right bank, and the Gogra on the left bank, should be specially noted. The Brahmaputra combines with the Ganges to make a common delta known as the Sunderbunds.

(4) Central India, comprising the Thar Desert, the Aravalli Hills, the Malwa plateau, the Vindhya Mountains, the plateau of Chota Nagpur, and the peninsula of Gujerat.

(5) Peninsular India, composed of the plateau of the Deccan; the Western and Eastern Ghats, which form a kind of raised rim to the plateau; the Satpura Hills and the Nilgiri Hills form respectively the northern and southern limits of the plateau; in the extreme south are the Cardamon Hills. On each side of the plateau is a coastal plain which is very narrow on the west, but of considerable width on the east. The chief rivers—Mahanadi, Godavari, Cauvery, and Kristna—all drain to the east.

(6) Ceylon, which is linked to India by a submarine ridge and a chain of islands known as Adam's Bridge.

(7) Burmah, which is composed of a series of north-to-south ranges separating parallel river valleys. The chief rivers are the Irawadi and the Salwen.

(8) The small islands, which include the groups Laccadive

and Maldive to the *south-west of India*, and the Andaman and Nicobar Islands to the south-east.

2.—Cultivation.

Rice is the staple food of the Hindoos in the wetter regions, viz. the lower Ganges basin, the delta of the Indus, the eastern and western coastal plains of peninsular India, and the southern portion of the Irawadi basin.

For successful cultivation the crop requires abundant moisture and bright sunshine. Although *some varieties can be grown on* the hillsides, the most prolific varieties require more water than is provided by even the abundant monsoon rains; hence irrigation is practised. *The chief ports of export are Calcutta and Rangoon.*

Cotton requires a rich soil, moderate rainfall, and abundant sunshine. The chief areas of cultivation in India are: the Deccan, *especially the north-western portion around Bombay, the United* Provinces, and the Punjab.

Tea is grown on the hill slopes in Assam, Travancore, and Ceylon.

Wheat is cultivated in the Punjab and the drier western portion of the Ganges basin.

Jute is the most important crop of the swampy lands near the mouth of the Ganges.

Opium is cultivated in the Ganges basin around Patna.

Millet is the chief food crop of the people on the Deccan and the drier portions of the Indo-Gangetic plain.

3.—Minerals. Coal is mined near Burdwan, to the west of Calcutta. Gold is mined in Mysore in southern India. Other minerals are salt, mica, and manganese, but the total wealth of minerals in India is not great.

4.—Manufactures. Although many of the industries of India are still conducted on the "domestic" system, there have been in recent years great developments in the "factory" system. Calcutta
t Bombay
and Calcutta; leather is tanned at Cawnpore. Of the native home industries the chief are the manufacture of silk, cotton, and woollen goods, of carpets, *domestic utensils, and foodstuffs.*

5.—Towns and Routes.

Bombay, the chief port of India, owes much of its importance
to *vessels which take the*
Su It is built on an island
which has been joined to the mainland by a causeway. From it routes diverge, by difficult passes in the Western Ghats, to Delhi, Allahabad, Calcutta, and Madras.

Calcutta, the former capital, is built on the Hugli, the only

branch of the Ganges delta which is navigable for large steamers. As the Ganges plain is the richest part of India, Calcutta has an enormous trade in the surplus products—rice, jute, tea, wheat, and cotton—produced in the basin.

Madras is the third great port of India. It commands routes north and south along the coastal plain, and westward across the Deccan.

Karachi is the great wheat port, situated a little to the west of the delta of the Indus. It is connected by railways to the Punjab, the Ganges basin, and Bombay.

Delhi, the present capital, is situated on the Jumna, at the western end of the plain of the Ganges. It owes its importance very largely to the fact that it controls the route from the north-west frontier to the most fertile plain in India. From it routes diverge to the Punjab, Calcutta, Karachi, and Bombay.

Among other important cities in India are Peshawar, which controls the route from Afghanistan via the Khyber Pass; Lahore, situated on the Ravi, nearly in the centre of the Punjab; Multan, situated at the focus of routes in the southern Punjab; Allahabad, at the confluence of the Jumna and the Ganges; Benares, the chief of the sacred cities of India; Patna, near the confluence of the Ganges with the Son from the south and the Gandak from the north.

Colombo, the capital of Ceylon, is situated on an excellent harbour at the meeting-point of routes to Bombay, the Red Sea, South and East Africa, Calcutta, Singapore, Australia and New Zealand. Its chief exports are tea and rubber.

Rangoon, the chief port of Burmah, is situated a little to the east of the delta of the Irawadi. It exports rice and teak. It is connected by railway with Mandalay, which is situated in the middle of the fertile lowland of the upper Irawadi.

CHINA

From the points of view of both physical and economic geography, China must be considered under the headings of the chief river basins, viz.:—

1.—**The Basin of the river Pei-ho** in the north. In this region the chief interest lies in the situation of the capital, Pekin, which controls the routes down the river to the port of Tientsin, eastward into Manchuria, north-westward through Kalghan into Mongolia, and southward to the rich plains of the Hwang-ho and Yang-tze-kiang.

2.—**The Basin of the Hwang-ho** consists of two portions:—
(*a*) A mountainous, barren western part; and
(*b*) The plain and delta, which together form one of the

richest and most densely populated areas in the world. The winters are cold, but the summers are warm, with adequate rainfall. The chief crops cultivated are wheat, millet, beans, and fruit. Some silk and cotton are cultivated in the more southerly districts.

The soil of the Hwang-ho basin is a yellow wind-blown dust known as "loess." When well watered, as in the lower part of the basin, it is wonderfully fertile.

Shan-tung is a mountainous peninsula which juts out to sea between the Gulf of Pechili and the Yellow Sea. It produces ground nuts ("monkey" nuts) and silk, and has considerable deposits of coal, iron, and gold.

Coal also occurs in vast fields in Shan-si, to the north of the Hwang-ho, but it has not yet been much worked.

3.—**The Basin of the Yang-tze-kiang.** This basin may be divided into four physical and economic divisions, viz.:—

(*a*) The little-known, scantily-populated mountainous region in the upper half of its course.

(*b*) The basin of Szechwan. Here the soil is exceedingly fertile, and by irrigation and careful cultivation almost any crop can be cultivated. Mineral wealth is considerable, but little exploited.

(*c*) The lake-basin of the middle course, in the region of the tributaries Han, Yuan, and Siang. Here the climate is warmer than on the Hwang-ho basin. The chief products are rice, cotton, silk, tea, and wheat. Coal and iron are found in the valley of the Siang river. Hankow, at the confluence of the Han and the Yang-tze, is the chief town.

(*d*) The deltaic plain near the coast. Here the agricultural products are similar to those in the preceding sections. The chief towns are Nanking, a former capital, and Shanghai, the chief port of the region.

4.—**The Basin of the Si-kiang.** Here the climate is still warmer, both summer and winter rain are more abundant, and the range of crops is consequently greater than in the more northerly basins. Rice, wheat, barley, tea, silk, cotton, and fruit are the chief crops. Minerals are abundant in the province of Yun-nan, but the only one mined to any great extent is tin. The chief town is Canton, situated at the mouth of the Si-kiang.

Hong-Kong is a small island separated from the mainland of China by a narrow channel. The island, with an adjacent strip of the mainland, belongs to Britain. The port of Victoria, on the island of Hong-Kong, is the chief centre of British trade with China and the East generally.

JAPAN

The Japanese Empire consists of a group of islands and peninsulas :—

(*a*) Hokkaido, Honshiu, Kiushu, and Shikoku, which together with several small islands make up Japan proper ; and

(*b*) The southern half of Sakhalin, the Kurile Islands, the peninsula of Korea, the Lu-chu Islands, and Formosa.

1.—**Physical Features.** Running through the principal islands of Japan proper is a central range of mountains, which throw off spurs at intervals. Between these spurs are numerous bays of lowland. The islands of Kiushu and Shikoku, which represent a second range of mountains, enclose between themselves and the main island the strait known as the " Inland Sea." Where the main range in Honshiu changes its direction in the widest part of the island is situated the famous volcano Fujiyama.

Rivers are many, but owing to the narrowness of the islands they are short, rapid, and of little use for navigation.

2.—**Climate.** The islands of Sakhalin and Yezo have very cold winters, due to the cold winds from the interior of Asia and the cold Kamchatka current. Honshiu has, however, comparatively warm winters and hot summers ; the January sea-level temperature is about 48° F., and the July temperature about 76° F. Formosa has still warmer winters and hotter summers.

Rainfall is abundant in all parts, except in Yezo and Sakhalin, where less than 30 inches per year is received. Throughout Japan most rain falls in summer, when the inblowing winds from the Pacific are laden with moisture.

3.—**Products.** In Sakhalin and Yezo, the long, cold winters practically prohibit cultivation. The coniferous forest, however, provides considerable quantities of lumber.

In the southern part of Honshiu, and in Kiushu and Shikoku, the typical products are rice, cotton, tea, silk, sweet potatoes, beans, maize, wheat, and tobacco.

Korea has a somewhat similar assemblage of crops, but rice and the soya bean are pre-eminent.

Formosa grows rice, sugar cane, tea, and the camphor tree.

4.—**Minerals.** Coal is mined in Kiushu and in the north-eastern part of Honshiu. Copper is obtained in Honshiu and Shikoku. Iron is mined in northern Honshiu. Other minerals include petroleum, gold, silver, lead, zinc, antimony, and mercury, but these are not present in large quantities. Sulphur is obtained from the volcanoes, and salt is obtained by the evaporation of sea water.

5.—**Fishing** is an important industry in the Japanese seas.

Cod and herring are caught in the Sea of Japan, while more tropical types of fish abound on the Pacific shores.

6.—**Industries.** Japan has made great strides in the development of manufactures during the present century. The chief articles manufactured are silk, cotton, woollen and iron goods, matches, paper, and earthenware; various food-products are prepared for home consumption; shipbuilding is also an important industry.

7.—**Towns.** Tokio, the capital, is in the centre of a fertile plain opening to the sea on the south-east, and backed by mountains on other sides. It is at the convergence of roads and railways, and is a great silk-manufacturing centre.

Yokohama is the port for Tokio, and the chief port in the Empire.

Osaka, Kobe, and Hiroshima are ports on the northern side of the Inland Sea. Osaka is the chief textile centre in Japan; Kobe is the chief port for the industrial region.

Kyoto, a former capital of Japan, is situated about the middle of Honshiu, where a break in the mountains forms a gateway between eastern and western coasts.

Nagasaki, situated near the western extremity of Kiushu, and near the most important coalfield of Japan, has much trade with Korea and China.

Hakodate is the chief town on the island of Yezo.

Chapter XXI

AUSTRALASIA

AUSTRALIA

1.—Physical Features.

(1) *The Eastern Highlands.*—These mountains, known generally as the Great Dividing Range, form a belt of high land, ranging up to 7300 feet in Mount Kosciusko, and running roughly parallel to the coast from Cape York Peninsula to the western boundary of Victoria. Various sections are distinguished by special names, e.g. the Grampians in Victoria; the Australian Alps, the Blue Mountains, and the Liverpool range in New South Wales; and the Denham range in Queensland. The height of the mountains decreases and the width of the mountainous belt increases towards the north. On the east there is a steep slope to a narrow coastal plain. On the west there is a gradual slope to the basins of the Murray, Darling, and Cooper rivers.

Tasmania may be regarded as a detached portion of the Eastern Highlands, the shallow Bass Strait having been formed by submergence.

The rivers of the eastern coast of Australia are short and rapid in the southern part, but in Queensland the Brisbane, the Fitzroy, and the Burdekin rivers provide important entrances into the land.

(2) *The Interior Lowlands.*—This is the region drained by: (*a*) the Murray, with its tributaries the Murrumbidgee, Lachlan, Darling, etc.; (*b*) the Cooper, Diamentina, and Finke rivers flowing to Lake Eyre.

The elevation of the land is generally below 600 feet, though in the east spurs from the Eastern Highlands invade the plain, while in the south the Flinders Range and the Lofty Range mark the eastern edge of a depression occupied by Spencer Gulf, Lake Torrens, Lake Gairdner, and Lake Eyre. All these are salt lakes, and vary considerably in their size.

The rivers also show considerable variation from season to season. The Murray is navigable for vessels of shallow draught, but the chief use of the rivers of the lowlands is for irrigation.

(3) *The Carpentaria Lowlands.*—The Gulf of Carpentaria is a comparatively shallow sea which was formed by the gradual

submergence of the land. The lowland ar
average width of about one hundred miles, ir the Murray-Darling plains,
side by many rivers, e.g. the Flinders, interior of Queensland is covered
rivers, which rise in the Eastern Hi
side of the gulf there are no streams of the continent are absolute desert,

(4) *The Plateau.*—All the cent practically the whole of the central
occupied by a plateau which is every hes rain per year, may be classed as
and rises in the middle to over 1 pulation. The population map (see
and the Musgrave range in far the greater portion of Australia is
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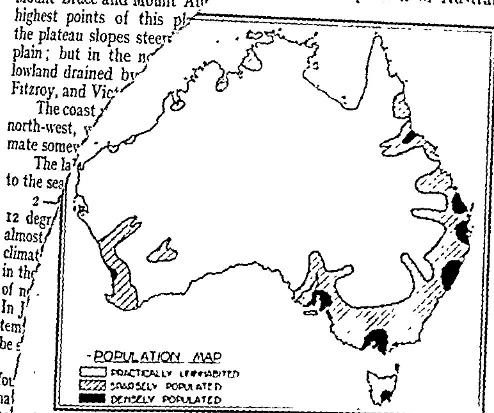


Fig 60

practically uninhabited The desert and semi-desert portions are, of course, uninhabitable except under exceptional conditions (e.g. mining and irrigation), but there are large areas in the north and in the Darling basin which should in the future reach a fairly high stage of development At present the population is concentrated in Victoria, the eastern parts of New South Wales, south-eastern Queensland, around Adelaide, and around Perth.

The economic geography of the Commonwealth will be de with on the basis of individual states

5.—**Victoria.**

(*a*) On the northern side of the Grampians and the Australian Alps, Victoria possesses one of the most productive sections of the interior plains of the Murray-Darling basin. Here wheat and fruit are cultivated, and cattle and sheep are reared. The rainfall is low, but is supplemented in many districts by irrigation from river-dams.

(*b*) The mountainous region is chiefly noteworthy as a gold-mining area, though there are also many sheep runs and dairy farms.

(*c*) The region to the south of the mountainous belt is a fertile fruit-growing, sheep-rearing, and dairying district. Gippsland, in the east, is mainly devoted to cattle and sheep.

Melbourne, situated on the river Yarra-Yarra, where the great bay known as Port Phillip approaches almost to the mountains, is the capital of Victoria and the chief seaport. It controls routes to east and west along the lowlands, and to the interior by a broad gap in the mountains immediately to the north of the city. Port Melbourne, at the mouth of the Yarra-Yarra, is the outport, at which the ocean liners and large cargo vessels are berthed.

Besides being the centre of the surrounding wheat, fruit, gold, cattle, and sheep regions, it has become a centre of many miscellaneous industries.

Ballarat is a gold-mining centre, and *Geelong* is a port of minor importance on the western side of Port Phillip.

6.—**New South Wales.** Here again distinction must be made between the coastal region, the westward facing slopes, and the plains of the Murray-Darling basin.

(*a*) In the coastal region and the lower valleys of the Eastern Highlands farming is somewhat similar in type to that practised in England, though the chief cereal is maize instead of wheat. Fruit farming and dairying are also important. Excellent coal is mined in the Newcastle district.

(*b*) The western slopes have only moderate rainfall, and are consequently devoted to wheat growing, sheep rearing, and cattle farming, equalling in these respects the plain of northern Victoria.

(*c*) The Murray-Darling plains have even lower rainfall, particularly in the western section. Wheat is cultivated, but the yield is rather precarious unless the land is irrigated.

Cobar is in the centre of a copper-mining district, while *Broken Hill* is world-famed as a silver, lead, and zinc mining area.

Sydney, the capital of New South Wales, is situated on a magnificent harbour at the mouth of the Parramatta river. It is the chief port of Australia, being the centre for the export of

wheat, wool, meat, *hides*, and *fruits* produced in the coastal regions and on the interior plains.

Newcastle, at the mouth of the Hunter river, is the centre [illegible]

[illegible] line [illegible] the Australian Alps to link up with the *Victorian railways*; branches from this route run to Canberra, the federal capital, and to Hay, the centre of an *irrigated region on the lower Murrumbidgee.* A second route runs *north-westward through Bathurst to Bourke* and Cobar. A third great route follows the coast northward to Newcastle, *then crosses the* Liverpool range and runs along the western side of the mountains to link up with the Queensland railways. The fourth route continues along the east coast from Newcastle to Brisbane.

7.—Queensland. In this state four economic divisions may be observed. The tropic of Capricorn divides the state *into a northern tropical portion and a southern subtropical region.* Each of these may again be divided into an eastern division consisting *of* the coastal plain and the Eastern Highlands, and a *western division consisting mainly of lowland.*

The south-eastern portion of Queensland, which centres on Brisbane, is an agricultural region, the chief crop being maize. *The south-western portion*, which includes the *upper part* of the Murray-Darling basin, is a sheep-rearing district. In the north-east, *from Rockhampton to Cairns*, tropical products like sugar cane, cotton, and coffee are cultivated. Mount Morgan, near Rockhampton, is a famous copper and gold mining centre. Charters Towers, *one hundred miles inland from Townsville*, is an important gold-mining centre.

The north and north-east of Queensland, which is drained to the *Gulf of Carpentaria*, is essentially a cattle-ranching area, though much of it is *still undeveloped*.

Brisbane, the capital and chief port, is situated on the navigable *Brisbane river, some twenty miles* from the mouth. Railways diverge from it along the coastal plain to the north and the south and inland across the *Darling Downs to Quilpie*.

Rockhampton is situated on the Fitzroy river. It is the outlet for the cattle ranches of the interior and for the [illegible] gold of Mount Morgan.

Townsville is connected with the interior by railway [illegible] Charters Towers to Cloncurry, a copper mining [illegible] Winton, in the *ranching country*. Railways [illegible] coastal plain to the north and to the south.

Cairns is a centre of the cane sugar industry

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Hobart in the south-east is the capital, and *Launceston* in the north is the chief port.

10.—**Western Australia.** Three economic regions may be observed in this state, viz.:—

(*a*) The south-western region, between Albany and Perth. Here the climate is of the Mediterranean type; fruit and wheat are cultivated, and there are large flocks of sheep.

(*b*) The gold-mining region of the western plateau. The chief goldfields are the Dundas field in the south; the Coolgardie field around the town of that name; the Yalgo, Murchison, and Mount Margaret fields between latitudes 30° S. and 25° S.

(*c*) The desert regions of the plateau. Here there are practically no inhabitants, and probably the region has no potential economic importance.

Perth, the capital, is situated on the Swan river, twelve miles from its mouth. From it railways diverge northward to Geraldton, southward to Albany, and eastward to Coolgardie and Adelaide.

Fremantle is the port for Perth.

Albany, situated on a fine harbour on the south coast, is the centre of trade for the southern part of the "Mediterranean" region.

Coolgardie, Kalgoorlie, and Norseman are gold-mining centres. Geraldton is the port for the northern goldfields, to which it is connected by rail

11.—***Northern Territory.*** This region was formerly part of South Australia, but the impossibility of communication with Adelaide made separation an essential condition of development. In spite of encouragement by the Federal Government, however, little advance has been made. The northern part of the region, which has abundant summer rain, could produce crops of cotton, sugar, and rice, but labour is lacking Between the wetter coast-lands and the southern desert is a region which is suitable for cattle ranching, but no great development in that direction has yet been achieved

Port Darwin is the most important town and port From it [illegible] runs inland through Pine Creek, a gold-mining area, to [illegible] to link up [illegible] along the route of the present [illegible]

12.—**The Federal District.** This is the region [illegible] Canberra, in the south-eastern corner of New South W[illegible] Canberra was chosen as the site for the federal capital owing to the conflicting claims of Melbourne and Sydney The Government buildings form the centre of the new city

NEW ZEALAND

1.—This Dominion, which lies 1200 miles to the south-east of Australia, is composed of North Island and South Island, with numerous smaller islands of which Stewart Island in the extreme south is the chief. The Dominion extends from latitude 34° S. to 47° S., and thus corresponds in position to France and Spain.

2.—**Physical Features.** Running longitudinally through both islands is a backbone of mountains. In South Island, where they are termed the Southern Alps, they lie near the west coast; in North Island, where various ranges receive distinctive names, they lie nearer the eastern coast, although the chief knot of high land, around the volcanic mountain of Tongariro, is placed almost centrally. Mount Egmont, a detached mountain in the south-western corner of North Island, is an ancient volcanic cone.

The characteristics of the coast are the direct consequence of the relief and structure of the interior. Thus the much indented coast on both sides of Cook Strait is due to the mountain ridges running out to sea as peninsulas. On the western coast of South Island are many fiords which owe their present form to glaciers which formerly extended to the coast from the high land of the interior. The northern peninsula of North Island owes its existence to an offshoot from the main mountain system.

Lakes are numerous in both islands. In North Island they are volcanic in origin and their waters are usually warm, sometimes even boiling. Lake Taupo is in the famous volcanic district of Rotorua. In the South Island the lakes owe their origin to glaciers, and are still fed by streams from glaciers.

The rivers are numerous in both islands, but on account of the disposition of the mountain ranges they are short, rapid, and of little use for navigation. The chief rivers are the Clutha and the Waitaki in South Island, the Wanganui and the Waikato in North Island. The chief areas of lowland are the Canterbury plains in South Island, and the plains around Hauraki Gulf and the lower courses of the rivers in North Island.

3.—**Climate.** The temperature of New Zealand is characterised by equability, due to the surrounding ocean. In summer the sea-level temperatures range from 70° F. in the north to 60° in the south; in winter from 54° in the north to 40° in the south. The climate is thus warmer and even more equable than that of Britain.

Abundant rain is brought at all seasons. (See Fig. 61.) In winter both islands are under the westerly wind belt, but in summer the northern part of North Island receives winds from the south-east, while the rest of the Dominion has westerly winds. As,

however, both westerly and south-easterly winds come from the sea, they both bring rain. In South Island the heaviest rainfall occurs on the western side, and the Canterbury plains on the east

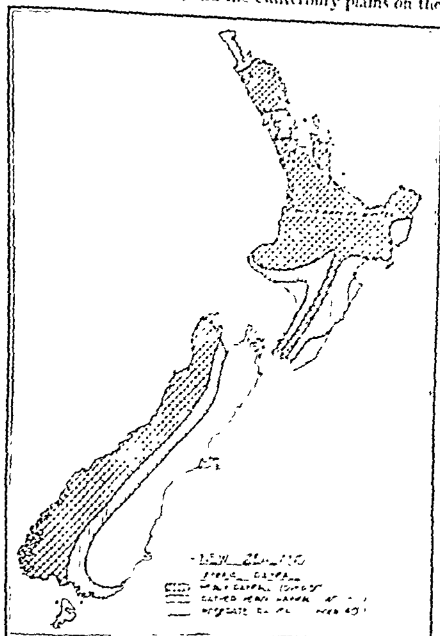


Fig. 41

are comparatively dry. North Island receives more rain in winter than in summer; the south-east is relatively dry, but the rest of the island has abundant rain at all seasons.

4.—**Vegetation.** The natural vegetation is temperate forest

in all parts except the sheltered lowlands, such as the Canterbury plains, which are natural grass-lands. The chief forest tree is the Kauri pine, which besides yielding valuable timber, produces a gum which is used in the manufacture of varnish, etc.

5.—**Population.** The population (see Fig. 62) is more evenly distributed than in Australia, the only areas with a very scanty population being the highlands of the centre of North Island, and the middle and south-west of South Island.

6.—**Farming.** Wheat is the principal crop on the Canterbury plains, where the rather dry climate, warm sunny summers, and fertile soil provide suitable conditions for cultivation.

Sheep rearing is most important in South Island, on the hills surrounding the Canterbury plains. The eastern part of North Island is also an important sheep-rearing district. Both mutton and wool are exported.

Cattle are reared on the lowlands throughout all the Dominion, but the chief dairying districts are in the north-western part of North Island, where much butter and cheese are produced for export.

Many parts of the country are eminently suited for the cultivation of fruit. Oranges and grapes can be grown in the Auckland district, while apples, pears, cherries, and various kinds of berries flourish in South Island.

7.—**Mining.** Gold is mined in the west-coast regions round Greymouth, Westport, and Hokitika, and in the province of Auckland. Coal occurs in a few localities, but the only coalfield which supplies more than purely local needs is that between Westport and Greymouth. This field not only supplies the greater part of New Zealand, but also produces a small surplus for export. Some iron is found in the same region, but is not extensively worked.

8.—**Manufactures.** The chief manufactures of New Zealand at present are such as arise out of the preparation of the vegetable and animal products for the market. With adequate supplies of coal, abundant water power, and supplies of raw material, New Zealand has all the essentials of a manufacturing country, and a start has already been made in the large towns with such industries as the manufacture of clothing, boots, domestic and farm implements, and furniture.

Auckland is situated on a good harbour at the head of Hauraki Gulf. The isthmus on which it is situated is only a few miles wide, but unfortunately the bay on the western side is too shallow for any but the smallest vessels. It is the largest city in New Zealand, and is the centre for the rich dairying, fruit-growing, and lumbering regions of the province.

Wellington, the capital, is situated on the land-locked bay known as Port Nicholson.

Napier and *New Plymouth* on east and west coasts respectively are centres of the dairy-farming and sheep-rearing industries *Christchurch*, situated some distance from the coast, is the

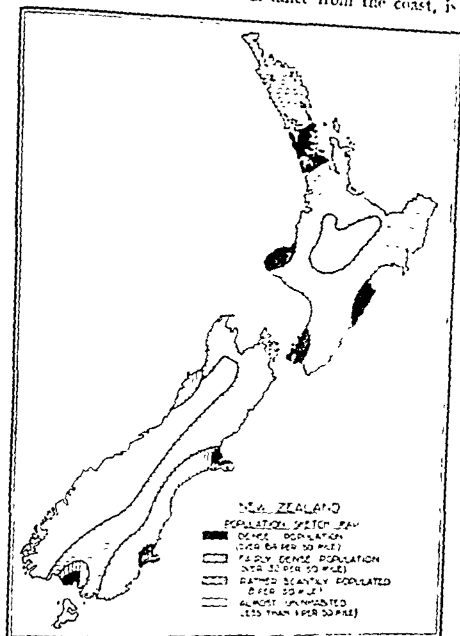


Fig 62

centre for the rich agricultural region of the Canterbury plains. Its outport is Lyttelton, situated on Port Lyttelton.

Dunedin is situated at the head of the broad estuary termed Otago Harbour. Moderately-sized vessels can reach the city, bu

the ocean liners and the larger cargo boats are berthed at the outport, Port Chalmers.

Invercargill, one of the most southerly towns in the world, is situated on Foveaux Strait which separates South Island from Stewart Island. Its port is Campbelltown, which is alternatively termed Bluff Harbour.

9.—**Railways.** In North Island the chief line of railway runs from Auckland southward through the volcanic region to Wellington, with branches to Lake Rotorua, Napier, Wanganui, and New Plymouth.

In South Island the main line of railway runs along the eastern coast from Parnassus, through Christchurch to Dunedin and Otago. From Christchurch a line crosses the Southern Alps via Arthur's Pass, to Greymouth and Hokitika. In the northern part of the island railways run some distance inland from Nelson and Picton, but do not connect up with the lines further south.

THE PACIFIC ISLANDS

The islands to the north of Australia are sometimes grouped under the general name of Melanesia.

New Guinea, the largest of these islands, is divided into three political divisions; the western portion is under Dutch control, the south-eastern part is British, and the north-eastern part, including New Britain, New Ireland, and the Bismarck Archipelago, is governed by Australia under a mandate from the League of Nations. The island is in a very primitive stage of development, and very little of the equatorial forest has been cleared. The only products of commercial importance are coco-nuts, pearls, and a little gold.

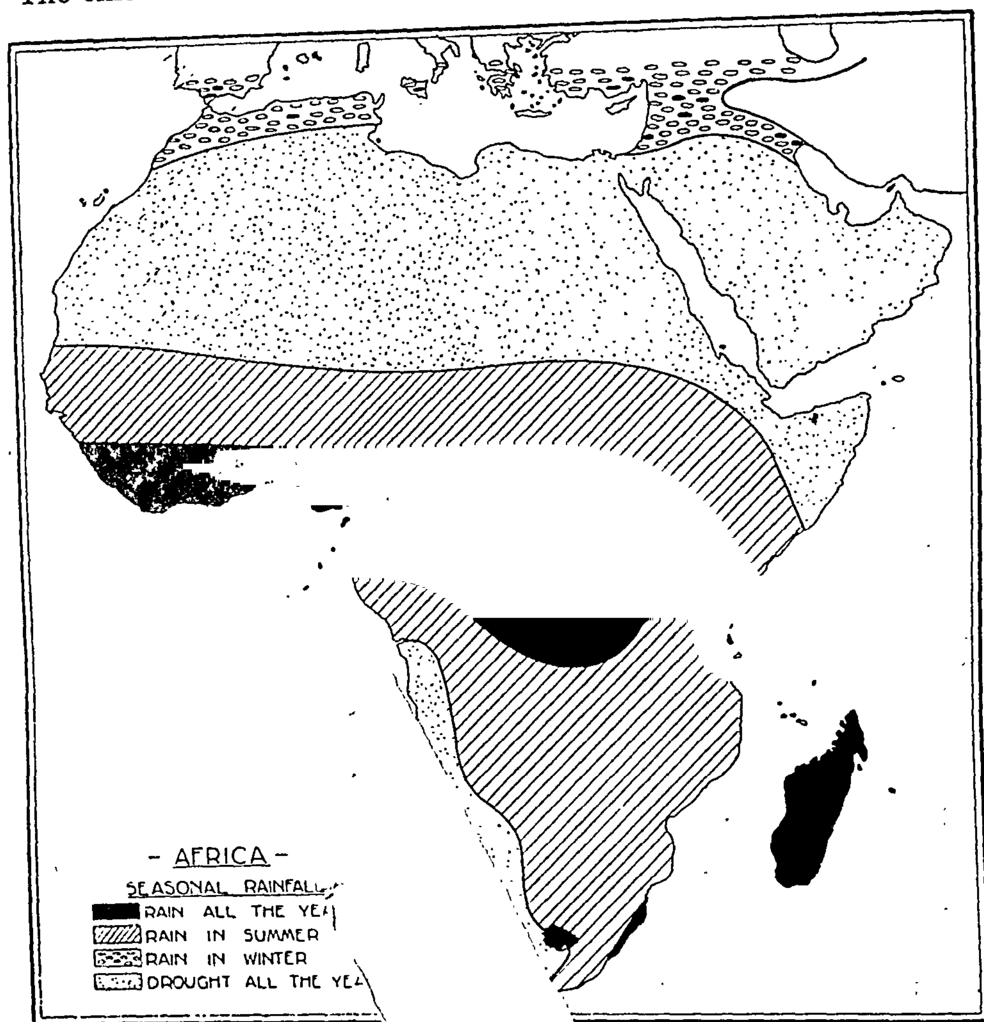
The numerous groups of small islands which are dotted about the southern Pacific are collectively known as Polynesia. They are either volcanic islands or coral islands. Their general characteristics are very similar, the chief product being coco-nuts, the dried flesh of which is exported as "copra." Many of the islands are also of great value as coaling stations, wireless stations, and as links in the submarine telegraph lines.

Hawaii, or the *Sandwich Isles*, situated near the tropic of Capricorn, in the centre of the Pacific, belong to U.S.A. The capital, Honolulu, is an important route centre.

Fiji Islands form an important link in the Trans-Pacific route from the Panama Canal to Australasia. Other groups of islands may be learnt from the map on page 31 in the Atlas. Note especially the New Hebrides and Samoa.

Minerals are probably abundant, and iron ore from the Atlas Mountains is one of the chief exports of Algeria.

6.—**Routes and Towns.** The chief towns—Tunis, Bona, Algiers, Oran, Tangier—are all situated on or near the coast. The chief line of railway runs westward from Tunis, connects all



II. The Nile Basin

The *Nile* rises in Lake Victoria, flows northward through Uganda and enters the plain of the Sudan. In this part of its course its fall is very slight and the current very sluggish. At Khartoum, in the Anglo-Egyptian Sudan, it is joined by the *Blue Nile*, and near Berber by the Atbara. Both these rivers rise in the Abyssinian highlands, and are flooded in summer by the heavy rains received by these highlands. It is the swollen waters of these two streams which account for the annual floods of the Nile.

Between Khartoum and Aswan, in Egypt, the Nile flows over six ledges of hard rock which cause cataracts. The lower course of the Nile is through a trench which the river has cut in the desert plateau on each side. At Cairo the delta begins and the river breaks up into several distributaries, the two chief of which find their way to the sea at Rosetta and Damietta.

The general and economical geography of the various territories included within the Nile basin is summarised below:—

(i) Abyssinia.

[illegible] characteristics and its independence [illegible] whole of its surface. [illegible] rounding lowlands by its very heavy summer rain, due to winds which are drawn in from the Indian Ocean by the rising of the air over the heated continent of Africa.

On account of the elevation the chief cultivated crops are those which are common in Europe—wheat, barley, etc.—rather than those of the surrounding lowlands.

The capital, Addis-Abeba, is connected by railway to Jibuti, a port on the Red Sea. The surrounding territories of Italian, French, and British Somaliland and Eritrea are of little economic importance on account of their aridity.

Uganda, though physically included in the basin of the Nile, is more conveniently dealt with under the heading of British East Africa.

(ii) The Anglo-Egyptian Sudan.

Climatically this region is characterised by warm dry "winters" and hot, rather wet summers. The summer rain, which is due to the great heat of the nearly vertical sun, decreases towards the north, and beyond Khartoum the climate is arid.

The vegetation zones correspond very closely to the distribution of rainfall. In the southern part there is tropical grass-land

with wood-lands interspersed; in the north the vegetation is scanty; the district north of Khartoum is a desert, except where the Nile floods create a fertile strip along each bank, or where scattered oases break the monotony of the sand.

The occupations of the natives naturally vary with the opportunities afforded by Nature. In the extreme south there are forests which yield rubber, ivory, and mahogany; a little further north the grass-land is suitable for cattle rearing and the cultivation of millet, beans, and wheat. An important product of this region is gum-arabic, which is an exudation from the bark of certain trees. Still further north the inhabitants are nomadic pastoralists, who wander from pasture to pasture with their flocks and herds.

Between the Blue and White Niles is the plain of Gezerah, which is now being irrigated from the Blue Nile by means of a dam constructed at Makwar. The irrigated land is being planted with cotton.

The chief towns of the region are:—

(*a*) Khartoum, an important native market, situated at the confluence of the Blue and White Niles, and connected to Egypt by railway.

(*b*) Berber, situated where the great bend of the Nile brings it within 200 miles of the Red Sea. Besides being on the main railway of the Nile valley it is connected by rail to the Red Sea ports of Port Sudan and Suakin.

(*c*) Wadi Halfa, situated on the "second" cataract (counting from the mouth), and practically on the boundary between Egypt and the Anglo-Egyptian Sudan.

(iii) EGYPT.

Egypt is nominally an independent state, but the British Government have retained control of the "zone" through which the Suez Canal passes.

With the exception of the Nile valley and delta the whole of Egypt is a desert; west of the Nile is the Libyan Desert, with a few scattered oases like Kharga and Suva; between the Nile and the Red Sea is the Nubian Desert. A population map of Egypt shows a densely populated strip, only a few miles wide, along the Nile valley, while the desert on each side is practically uninhabited. Egypt depends for its very existence on the flood waters of the Nile.

The flood season lasts from July to November, winter from December to March, and summer from April to June. During the flood season the water overflows all the low-lying land on each side of the river; at other seasons water is obtained from the river

by primitive machines embodying the principle of leverage (the shaduf) or of interlocking *cog-wheels (the sakiyeh). During* the British occupation, several dams were built to retain the surplus flood waters until they are required at other seasons. The water is then conducted over the thirsty land by a series of irrigation canals. *In this way the area of land capable of perennial* cultivation has been considerably increased.

The chief crops cultivated in Egypt are wheat, maize, millet, sugar cane, rice, fruit, and cotton. Practically all the food crops are required for home consumption, and almost the only exports are cotton, cotton-seed, and cotton-seed oil. Egyptian cotton is of high quality, being remarkable for its strength and silkiness. Cigarettes are exported, but the tobacco of which they are manufactured is imported from the Balkan Peninsula.

Alexandria, situated on a good harbour a little to the west of the Nile delta, is the principal port. Rosetta and Damietta are small ports situated where the two principal mouths of the river enter the sea. Port Said is situated at the entrance to the Suez Canal, which runs via the Bitter Lakes, across the low isthmus of Suez to the town of Suez.

Cairo, the capital, owes its importance to the fact that it is *situated at the head of the delta ; it thus holds the balance between* the delta and the valley, and controls the routes to Port Said, *Alexandria*, and *upper Egypt*. Aswan, situated just below the first cataract, is notable as the site of the chief irrigation dam on the Nile. Memphis, Thebes, and Luxor are famed for the temples, tombs, etc., which bear testimony to the high stage of civilisation reached in Egypt at a very early period in the history of mankind. Kosseir is a port of minor importance on the barren Red Sea coast.

III. The Sahara

Physically the Sahara is a great plateau, between 600 and 1200 feet high in the west, and over 1200 feet high in the east . separating these two sections of the plateau is a ridge of higher land of which the Tasili plateau and the mountains of the Tibesti district are parts.

The aridity of the Sahara is due to the fact that it is in the belt of north-east Trade Winds, which blow from the land mass of Euro-Asia and are therefore very dry. The winters are warm and the summers very hot, and the difference between day and night temperatures is very great.

The common conception of the Sahara as a sea of sand is true for certain portions only ; a large part of the surface is composed of a series of bare, rock-strewn hills, absolutely devoid of

vegetation, while at other places there are patches of coarse, dry, deep-rooted, drought-resisting grasses and shrubs which provide a scanty pasturage for meagre flocks of sheep and goats which are driven from place to place by nomadic Arabs.

At irregular intervals on the surface of the desert springs and pools of fresh water make oases which are often remarkably fertile. Here a settled population cultivate wheat, maize, millet, barley, sugar cane, and, above all, dates. Lines of oases mark the caravan tracks across the desert. The chief of these caravan routes lead from Timbuctoo on the Niger to Fez; from Kano and Lake Chad to Tripoli; and from Khartoum to Kano and Timbuctoo.

IV. West Africa

Politically West Africa is divided between Britain and France, with the exception of the free (negro) state of Liberia, and the small territory of Portuguese Guinea. Physically the region consists of a plateau, rising steeply from the coast to a height of 3000 feet. The chief river is the Niger, which rises in the Daro Mountains, flows north-eastward to Timbuctoo, then south-eastward to the Gulf of Guinea. The only important tributary is the Benue. Other rivers are the Volta, the Gambia, and the Senegal.

Climatically there are two divisions based on rainfall. The coast-lands north of the Gulf of Guinea have an equatorial type of climate, with constant high temperature, and heavy rain at all seasons, due to inblowing winds and the nearly vertical sun. Further north the winters are warm and dry, and the summers hot and wet, the summer rain being due to the fact that the sun is overhead north of the Equator. The total amount of rain decreases towards the north.

The vegetation zones correspond to the rainfall divisions. The Guinea coast-lands are clothed with dense equatorial forest, while the summer rain lands further north have tropical grass-land and savanna (i.e. mixed grass-land, jungle, and wood-land).

The chief products of the equatorial coast-lands are rubber, ivory, cocoa, palm oil, coco-nut oil, and copra. On the grass-land region the natives rear cattle and cultivate millet, cotton, and ground nuts. Metals are probably abundant throughout the region, but the only minerals worked are tin (Nigeria) and gold.

The British possessions in this region are Nigeria, Ashanti (usually known as Gold Coast), Sierra Leone, and Gambia Colony. Of these Nigeria is the most important, having the densest population of any large division of Africa, with the exception of the Nile valley. The general description of the whole region given in the

previous [illegible]
be repeat [illegible]
the chief [illegible]
is the chief port. It is connected by rail to Kano, a great caravan *centre on the edge of the desert.*

Accra, Monrovia, Freetown, and *Bathurst are the chief ports* of Gold Coast, Liberia, Sierra Leone, and Gambia *respectively.* Freetown is an important coaling station and half-way house on *the ocean route to the Cape.*

Timbuctoo is situated near the *most northerly point of the* Niger, where several caravan routes converge after crossing the Sahara.

V. The Congo Basin

Politically the Congo basin is almost co-extensive with the *Belgian territory. Physically it is a basin-like plateau situated* between the higher plateaux of southern Africa, East Africa, and equatorial Africa. Near the coast this basin is contracted by the coastal mountains of lower Guinea, through which the Congo *flows in a gorge.*

The climate of the basin is mostly of the equatorial type, with heavy rain and great heat at all seasons; on the southern edge of the basin the "winters" are, however, decidedly dry, and *the climate approximates to that of the* Sudan in northern Africa. The vegetation again corresponds very closely to the climatic divisions: where the rainfall is heavy throughout the year there is dense equatorial forest; in the south the summer rain region is a *tropical grass-land* similar to the Sudan.

The density of population is, on the average, about 12 per square mile, i.e. about one-twentieth that of the Nile valley. The chief products are rubber, palm oil, *and ivory, while rice,* [illegible] the native inhabitants. [illegible] gmy tribes who lead a very primitive life, [illegible] ature, wear practically no clothes, build no permanent dwellings, and *obtain* a livelihood *by hunting and fishing.*

Boma, at the mouth of the Congo, is the chief port. From this port a railway runs inland to Leopoldville, near Stanley Pool. From here to about latitude 15° S. the river is navigable, except for the stretch near Stanley Falls, which are avoided by means of a short line of railway. This line will probably be continued at some future time to link up with the *Rhodesian* system, and so form a link on the proposed Cape to Cairo railway.

VI. British East Africa

1.—**Physical Geography.** The territories comprising this region are the Uganda Protectorate, Kenya Colony, Tanganyika Territory, and the islands of Zanzibar and Pemba.

Physically the region consists of a rather narrow coastal plain, and a large portion of the equatorial lake plateau. This plateau, which has an average elevation of 4000 to 5000 feet, is bordered by high ranges on the eastern and western sides. Running approximately from south to north is a great "rift valley," formed by the earth sinking between two faults. The course of this rift valley may be traced on the map via Lakes Nyassa, Tanganyika, Victoria, and Rudolf; it is continued northward across the middle of Abyssinia to the southern end of the Red Sea, then up the Red Sea to the valley of the Jordan.

The climate of the coastal regions is of the equatorial type, with high temperatures and heavy rainfall at all seasons. Further inland, however, the greater elevation moderates the temperature, and as the rainfall is also lower the climate is generally healthful.

The natural vegetation of the coastal region is tropical forest and jungle. On the mountains of the interior are temperate forests; but the greater part of the plateau is a natural grass-land, though towards the north the increasing aridity causes a gradual passage to the semi-desert of Italian Somaliland.

2.—**Economic Geography.** In the hot, wet coastal regions the chief products are coco-nuts and rice. Zanzibar and Pemba are famous for cloves.

On the plateau the natives are chiefly cattle farmers, though they also cultivate some crops such as maize, millet, and bananas. The plateau region of Kenya is suitable for occupation by white men, and considerable development in this direction may be expected in the future. Maize, coffee, flax, and cotton can be profitably cultivated.

3.—**Routes and Towns.** In Kenya the principal route is the railway from Mombassa, on the coast, across the plateau to Nairobi, the capital, and thence to Kisumu on Victoria Nyanza.

In Tanganyika Territory a railway runs from the port of Dar-es-Salaam, via Tabora, to Ujiji on Lake Tanganyika.

VII. British South Africa

This region consists of the following territories: Northern Rhodesia, Southern Rhodesia, South-West Africa, Transvaal, Orange Free State, Natal, and Cape Colony. The four last-named states comprise the Union of South Africa.

1.—**Physical Features.** South Africa is a vast plateau which rises up from the coast in a series of terraces. In the south of Cape Colony these terraces are known as the Great and Little Karroos, while the intervening steep slopes are mapped as [illegible] Langenberg. In [illegible] the Drakensberg [illegible] ;et. The plateau [illegible] l and the Orange Free State the general slope is to the west, but near the western coast higher land again occurs; consequently the plateau as a whole is basin-shaped, and many of the rivers—e.g. the Kubango—fail to find an outlet to the sea. The Orange river, on the other hand, breaches the western wall of the plateau, and reaches the Atlantic a little north of Port Nolloth.

The chief rivers flowing to the eastern coast are the Zambezi and the Limpopo.

2.—**Climate.** Four climatic divisions may be distinguished in this region, viz.:—

(1) The east coast region of Natal. Here there is abundant rain at all seasons from the prevailing south-east Trade Winds. The climate of the coast is hot at all times, but the terraces by which the Drakensberg rise up to the plateau have cooler climates suitable for occupation by Europeans

(2) The south-western region around Cape Town, with rain in winter and drought in summer. This is of the Mediterranean type.

(3) The Veldt, which has high summer and moderate winter temperatures, low rainfall in winter and moderate rainfall in summer.

(4) The Kalahari district between the Veldt and the east coast has little rain at any season, being shut off from the rain-bearing Trades by the Drakensberg.

3.—**Vegetation.** Corresponding to these climatic divisions are four types of vegetation, viz.:—

(1) The tropical forests of the eastern coast-lands.

(2) The evergreen wood-lands of the south of Cape Colony

(3) The temperature grass-lands of the Veldt in Cape Colony, Orange Free State, and the Transvaal, passing towards the north into the tropical grass-lands of Rhodesia.

(4) The semi-desert of the Kalahari, passing towards the west into the absolute desert of the western coast-lands.

ECONOMIC GEOGRAPHY

(i) Cape Colony.

Around Cape Town the mild, moist winters and the hot [illegible] summers allow of the cultivation of wheat, barley, and [illegible]

e.g. grapes, oranges, and peaches. Wine is manufactured, and there is increasing exportation of fruit to Great Britain.

The Karroos have insufficient rainfall for agriculture, and are, therefore, devoted chiefly to sheep farming and the rearing of ostriches. Some districts, however, are now irrigated and yield crops of wheat, fruit, and tobacco.

The Veldt is a sheep-rearing, cattle-raising, and maize-growing region. Mohair, from the Angora goats, is a valuable product.

Cape Town, situated on Table Bay, is the terminus of the railways and the natural focus of routes from Europe and West Africa, India and East Africa, Australia, New Zealand and South America. Its chief exports are gold, wool, fruit, hides, and skins. Simonstown is the naval station.

Port Elizabeth and East London are other ports, situated on the only harbours of the south-east coast.

Kimberley, situated near the Orange Free State boundary, is a famous diamond-mining centre.

(ii) NATAL.

On the coastal strip the high temperatures and heavy rainfall make possible the cultivation of sugar-cane, maize, oranges, bananas, tea, and tobacco. On the higher terraces to the west the chief products of economic importance are maize, timber, coal, and wattle-bark (used in tanning). On the higher slopes cattle and sheep are raised.

Durban, situated on one of the best harbours in South Africa, is the natural outlet for the produce of Natal, the Transvaal, and the Orange Free State. Pietermaritzburg, the capital, is situated on the first of the inland terraces. Newcastle and Dundee are coal-mining towns.

(iii) TRANSVAAL AND THE ORANGE FREE STATE.

The rather dry grass-lands of these states are devoted mainly to the rearing of cattle and sheep. Maize is the chief cereal cultivated, though wheat and tobacco are grown in specially favoured districts.

Gold is mined in the ridge of hard rock known as the Witwatersrand, and some diamonds are obtained near Pretoria.

Johannesburg, the largest town, is the centre of the gold-mining district and the focus of the railways. Some coal is mined near-by. Pretoria is the capital of the Transvaal, and the administrative centre for the Union of South Africa. Bloemfontein is the capital of the Orange Free State, and is the legal centre for the Union.

(iv) Southern Rhodesia.

Here, as on the Veldt, the chief types of farming are the rearing of cattle, and the cultivation of maize and tobacco. Mineral wealth is considerable, but is only exploited near the railways. Gold, coal, and chromium are the chief minerals produced at present, but many other metals are known to exist, and will be worked in the future.

The chief towns are Bulawayo and Salisbury.

(v) Northern Rhodesia, lying between Southern Rhodesia and the Belgian Congo, is not yet fully explored, and is probably too hot for permanent occupation by Europeans.

Broken Hill is a lead and zinc mining centre.

THE SOUTH AFRICAN RAILWAYS

[illegible] in South Africa begins at Cape Town, [illegible] diamond- [illegible] western [illegible] boundary of the Orange F[illegible] in Southern Rhodesia. [illegible] over the gorge of the Za[illegible] Broken Hill in Northern Nigeri[illegible] district of the Belgian Congo. [illegible] up with a continuation of the Cape to Cairo route.

Other railways are best learnt in connection with the principal ports and inland railway centres. From De Aar, a line runs north-westward to Luderitz and Swakopmund in South-West Africa, and a continuation of this line to the south-east leads to Port Elizabeth

From Port Elizabeth a line runs northward through Bloemfontein, Johannesburg, and Pretoria to the northern boundary of the Transvaal. East London also has connection with this line. From Durban a line runs westward through Pietermaritzburg, Ladysmith, and Harrismith to Johannesburg, while a second line runs through Newcastle and Johannesburg to link up with the main South African railway at Mafeking.

From Pretoria and Johannesburg lines run to the port of Lourenço Marques, on Delagoa Bay.

THE AFRICAN ISLANDS

Madagascar is separated from Africa by the Mozambique Channel. From the physical point of view it consists of a central plateau, 5000 to 6000 feet in height, sloping steeply to the east

st and more gradually to the west. Lying as it does almost rely within the tropics, its temperature is high at all seasons, ugh the great elevation of the interior causes considerable uction of temperature. The island is situated in the track of e south-east Trades; consequently the eastern side receives undant rainfall, while the western side has only a moderate nount. As is usual in tropical regions the chief rains fall in the ummer half of the year.

The island is in a primitive stage of development, and the atives produce little surplus for export. The chief products n the coastal region are rice and rubber, while on the plateau cattle rearing is the chief occupation. The chief articles of export are raffia, gold, and graphite (black lead).

The chief port is Tamatave on the east coast, and the capital is Antananarivo, in the middle of the island. The island is governed by France.

The Mascarene Islands, of which the chief are Mauritius (British) and *Réunion* (French), produce cane sugar.

The Comoro Islands (French) and the *Seychelles* (British) lie to the north of Madagascar.

The Azores (Portugal) lie in the Atlantic, almost due west from Lisbon.

Madeira (Portugal), lying 400 miles to the west of Morocco, is noted for its wine, and for the efficacy of its mild equable climate in the treatment of certain types of illness.

The Canaries (Spain) include the islands of Grand Canary and Teneriffe. They also are famed for their wine and fruits.

The Cape Verde Islands (Portugal) lie on latitude 15° N., about 350 miles from the African coast. The climate, in contrast to that of the islands further north, is rather arid.

St. Thomas, a Portuguese island situated on the Equator, in the Gulf of Guinea, produces cocoa.

Ascension and *St. Helena* are British islands situated about the middle of the South Atlantic. They were formerly of considerable importance as calling stations on the sailing-ship route to the Cape.

Tristan da Cunha, situated on latitude 32° S., midway betweer South America and South Africa. The inhabitants, who are o British descent, live by fishing, cattle-rearing, and the cultivatio of root crops and vegetables.

Chapter XXIII

SOUTH AMERICA

1.—*Physical Features.* Three belts of high land may be distinguished in South America, viz.:—

(*a*) *The Andes.*—These are connected with the Rocky Mountain system via the isthmus of Central America, and with the Lesser and Greater Antilles by the *Sierra de Merida*, which runs along the north coast of Venezuela. The Andes are composed of several distinct mountain ranges, of which the chief are the Western Cordillera and the Eastern Cordillera; these enclose between them high plateaux, such as the "basin" of Quito and the plateau of Bolivia. There is also in many parts a distinct coastal range, which, as in Chile, encloses between it and the Western Cordillera a fertile central valley. The most notable peaks are Aconcagua (23,081 feet) and Chimborazo (20,600 feet)

(*b*) *The Guiana Highlands*, which form a high plateau occupying Southern Venezuela and the boundary between Brazil and the Guianas.

(*c*) *The Brazilian Highlands*, which form a plateau of an average elevation of about 2000 feet. The plateau rises steeply from the coast and slopes gradually to the interior. The Sierra do Mar, on the coast of southern Brazil, rises to nearly [illegible] feet.

Between the Andes on the west, the Guiana Highlands on the north, and latitude 20° on the south, is the basin of the Amazon. The chief head-streams—the Ucayali, the Marañon, the Madeira, and the Putumayo—rise on the Andes plateau and break through the Eastern Cordillera by deep gorges. The Rio Negro is the chief tributary from the Guiana Highlands, while from the Brazilian Highlands flow the Tapajoz and the Xingu. The Tocantins, whose mouth is separated from that of the Amazon by Marajo Island, is frequently reckoned as one of the tributaries of the Amazon. The tributaries flowing from the Andes are navigable beyond the Eastern Cordillera—a distance of 3000 miles from the coast. Manáos, at the confluence of the Amazon and the Rio Negro, can be reached by large ocean-going steamers, while the head of navigation for smaller ocean steamers is Iquitos in Peru.

Between the Andes and the Brazilian Highlands is the system

of rivers which combine to form the Rio de la Plata. The chief component streams are the Paraná, the Paraguay with its tributaries the Pilcomayo and the Vermejo, and the Uruguay. The headwaters of the Paraguay are separated from those of the Guapore tributary of the Madeira by only a few miles of lowland.

South of the estuary of the La Plata, the chief rivers are the Negro and the Chubut. In Brazil the river San Francisco forms a navigable highway to the interior of the plateau.

The Orinoco drains the plains of Venezuela between the Guiana Highlands and the Sierra Merida. One of its headstreams, the Cassiquiare, forms a connection with the Rio Negro.

On the Pacific slope there are few rivers of any importance; most of them dry up before reaching the sea, and the rest are short and rapid. In Columbia the rivers Magdalena, Cauca, and Arato flow between the parallel ranges of the Andes to the Caribbean Sea.

2.—Climate.

(*a*) *Temperature.* South America stretches from 10 degrees north of the Equator to 55 degrees south, and ranges from sea level to over 20,000 feet; consequently there are many varieties of climate in the continent.

The January (summer) isotherms reveal the following facts:—

(1) The hottest belt (over 80° F.) is situated to the south of the Equator, in the interior of the continent and around the north-eastern angle of Brazil.

(2) The west coast is cooler than the east coast. This is due in large measure to the cold Peruvian current which sweeps northward along the west coast.

From the July (winter) isotherms we learn:—

(3) The hottest belt is now north of the Equator.

(4) There is little difference of temperature between the coast and the interior (contrast with Euro-Asia).

(5) The west and east coasts show little differences of temperature.

(6) No part of South America has an average sea-level temperature below freezing point in the coldest month.

Combining the information deduced fron both isotherm maps, we learn:—

(7) That South America is characterised by a greater equability of climate than any of the other continents.

(*b*) *Winds and Rainfall.*—North of the Equator the north-east Trade Winds bring rain to the whole region, though the rainfall of the northern summer is heavier than the winter rainfall.

South of the Equator the south-east Trade Winds bring rain to eastern and central South America, though here again the

fairly high temperature and bright sunshine, give it a Mediterranean type of climate.

On the Andes the climate varies with the altitude, from tropical heat to Arctic cold.

3.—**Vegetation and Natural Regions.** The vegetation map (see Atlas, page 4) shows the following vegetation regions, which may also be taken as the natural regions of South America :—

(1) The Amazon basin and the coastal regions of Ecuador and Colombia are clothed with equatorial forest, due to the great heat and fairly constant rainfall.

(2) In Venezuela and the Guianas are large areas of tropical grass-lands; these correspond to the region of summer rain and winter drought, and may be compared with the Sudan region of Africa.

(3) The greater part of the Brazilian plateau is also of the tropical grass-land, summer-rain type, and again compares with the Sudan.

(4) Around the Rio de la Plata are the Pampas, a region of temperate grass-land.

(5) In Patagonia (the southern part of Argentina) the natural vegetation is poor steppe-land and semi-desert, due to the low rainfall.

(6) Southern Chile has deciduous forests somewhat similar to the wood-lands of Britain.

(7) Middle Chile has a Mediterranean type of evergreen wood-land.

(8) Northern Chile and southern Peru comprise the Atacama desert, which owes its origin to the high temperatures and lack of rain-bearing winds.

(9) The Cordillera has Alpine type of flora, with scrub-land and poor grass-land on the Andean plateaux.

ECONOMIC AND GENERAL GEOGRAPHY OF THE SOUTH AMERICAN STATES

(Note.—Before studying the following sections the student should revise the above accounts of the general physical and climatic geography from the point of view of the individual states, and with the aid of the Atlas physical map compile an account of the relief, rivers, climate, and vegetation of each state.)

1.—**Argentina.**

(*a*) *The Pampas.*—This is the natural grass-land between the Colorado and the Uruguay rivers. It is the chief stock-raising and agricultural region of South America. Wheat, maize, linseed,

and fruit are the chief crops cultivated, and large quantities of wheat are available for export.

The cattle are reared as the basis of the frozen and tinned meat and meat-extract industries. Wine is produced in the irrigated region around Mendoza.

(*b*) *Patagonia* is a sheep-rearing area, producing both wool and mutton for export.

[illegible]

Rio de la Plata, is the capital and chief port of the country. From it railways diverge in all directions across the Pampas. The line through Mendoza is continued across the Andes by a tunnel under the Uspallata Pass, and links up with the Chilean railway from Valparaiso. The chief exports are wheat, maize, linseed, frozen and tinned meat, and meat extracts.

Other wheat ports are Rosaria, La Plata, and Bahia Blanca.

2.—**Uruguay.** Nearly the whole of this state is covered with temperate grass-land; consequently the chief industry is the rearing of sheep and cattle. The chief exports are frozen and salted and tinned beef, and meat extracts. Wheat, maize, and linseed are also cultivated, and figure in the list of exports.

Montevideo is the chief port and centre of the railway system. Fray Bentos and Paysandu are towns engaged in the preparation of meat and meat extract.

3.—**Paraguay.** The greater part of this state is covered with tropical forest, but in the north-west there are large areas of tropical grass-land. Cattle are reared on the grass-lands, and there is some exportation of preserved meat.

The chief products from the forest area is yerba maté, a kind of tea, which is exported to all parts of South America, and tannin extract.

The greater part of the country is as yet undeveloped, but it is probable that in the future considerable crops of cotton, [illegible]

[illegible] s situated on the navigable river [illegible] the *Pilcomayo* It has a considerable river trade and [illegible] cted by railway to Buenos Aires.

4.—**Brazil.** Brazil may be divided into three natural regions, viz.:—

(1) The Amazon Lowlands.
(2) The Atlantic Coast-lands.
(3) The Plateau.

Of these the coastal region is the only one which is at all well developed. Here the density of population is over 20 per square mile and rises, about Rio de Janeiro and San Paulo, to over 64 per square mile. In the Amazon lowlands the population is less than one per square mile, except on the river banks, where there is a fringe of rather denser population. On the plateau the population gradually decreases westward from the high eastern rim, the interior having an average of less than one per square mile.

Coffee is the most important product of Brazil, the chief region of cultivation being around San Paulo. The greater part of the coffee of Brazil, which provides two-thirds of the world's supplies, is sent out from the port of Santos.

Rubber is the chief product of the Amazonian forests. It is obtained by cutting and tapping the wild rubber vines and rubber trees, and collecting the sap which when coagulated forms raw rubber. Formerly Brazil was the chief source of rubber, and considerable quantities were exported from Para and Ceara, but the industry has not been able to compete with the supplies from the rubber plantations of Malaya and Ceylon, and now Brazil only supplies about one-twentieth of the world's total.

Cacao, from which cocoa and chocolate are manufactured, is grown on the fertile, hot, and humid coastal lowlands near the Equator. Bahia is the most important port for the export of cacao.

Brazil nuts are exported from Para.

Cotton is cultivated in many districts; production is not yet large, but the quality is good and conditions are suitable for greatly increased output. Pernambuco is the chief cotton-exporting town.

Cane sugar is cultivated on the hot, moist, alluvial lowlands south of Rio de Janeiro, and around Pernambuco.

Tobacco is cultivated in all the more highly developed parts; most of it is for home consumption, but some is exported from Bahia.

Other cultivated products are coco-nuts, rice, beans, oranges, and pine apples. Logwood, used as the basis of dyes, is exported from the Amazonian forests.

Cattle rearing is the chief industry on that portion of the plateau known as the Matto Grosso. Here the cattle run wild, and there is little attempt to divide the natural grass-land into paddocks. Formerly the cattle were reared for their hides only, but there are now several freezing and canning factories in operation.

Sheep rearing is carried on the temperate portion of Brazil, between the coast and Uruguay and Paraguay.

Minerals.—Gold, diamonds, coal, copper, iron, and manganese are mined on a small scale, but there is every possibility of future developments in the mining industry.

Towns and Routes.—Rio de Janeiro, *the capital of Brazil*, is situated on an almost land-locked harbour which is said to be one of the finest in the world. It is the centre of the Brazilian railway system.

Santos is the port for the coffee-growing state of San Paulo.

Bahia, the capital of the state of that name, is the chief cacao and tobacco port.

Pernambuco exports cotton, sugar, and hides.

Para, situated at the mouth of the Tocantins and at the usual entrance to the Amazon, controls the trade of the Amazon basin. Its chief exports are vanilla, logwood and rubber.

Manáos, situated a thousand miles from the ocean, is accessible by large ocean-going steamers.

The railways of Brazil radiate fan-wise from San Paulo, Rio de Janeiro, Bahia, and Pernambuco. *From San Paulo* a line runs eastward to Rio de Janeiro, another to the coast at Santos, a third westward to Corumba on the Paraguay river, and a *fourth south-westwards to link up with the Uruguayan* railways to Montevideo. The systems diverging from the ports of Bahia and Pernambuco are not linked with each other or with the lines further south.

5.—**Chile.** Chile consists of a comparatively narrow belt stretching along the west coast of South America from latitude 18° S. to Cape Horn, and from the Pacific coast to the crest of the Andes.

Four climatic divisions, which coincide with four well-marked economic regions may be noted, viz. :—

(1) *Northern Chile*, as far south as latitiude 30° S., is a desert. (For the causes see the introductory paragraphs on Climate.) This region is, however, of great importance from an economic point of view, as it contains the world's principal deposits of nitrate of soda, a mineral which is used in the manufacture of gunpowder and as a fertiliser. Arica, Iquique, and Antofagasta are ports engaged in the exports of nitrate.

(2) *Middle Chile*, between latitudes 30° S. and 40° S., has a [illegible] paragraphs). Physically [illegible] viz. :—

(*a*) A narrow Coastal Plain.

(*b*) The Coast Range.

(*c*) The Central Valley.

(*d*) The Andes.

Of these the most important is the central valley. Here

wheat, vines and Mediterranean fruits are cultivated, and sheep and cattle are reared. A population map shows that nearly the whole of the Chilean population is concentrated on the coastal plain and in the central valley.

Santiago, the capital, is situated in the middle of the fertile valley. It is connected by rail to the "nitrate" ports of the north; to Valdivia in the south; via the Uspallata across the Andes to Buenos Aires; and to Valparaiso, the greatest of Chilean ports.

(3) *Southern Chile* has a wet, cool, equable climate, and is still clothed with virgin temperate forest. Off the coast is a chain of islands which represent the partially-submerged coastal range of Middle Chile. The whole region is practically undeveloped, and the occupations of the scanty population are fishing and lumbering. Some coal is mined on the island of Chiloe.

(4) *The Andes.*—The economic interest of the mountainous region centres round its mineral wealth. Gold, silver, copper, and other minerals occur, but the output is not large on account of the difficulties of transport.

6.—**Bolivia.** Four physical divisions may be distinguished, viz.:—

(*a*) The Western Cordillera.
(*b*) The Eastern Cordillera.
(*c*) The plateau between (*a*) and (*b*).
(*d*) The eastern lowland, the northern part of which is drained to the Amazon by the river Marmore, and the southern part to the La Plata by the Pilcomayo.

Of these the plateau is the only one of economic importance at present. As the height of the plateau is over 12,000 feet the climate is too cool for the cultivation of wheat and maize; consequently the chief food crops are barley, potatoes, and a kind of millet.

Mining, however, is of considerable importance. Bolivia supplies about one-third of the world's tin. The chief tin-mining districts are around La Paz and Potosi. Silver is mined near Potosi and Oruro. Gold is known to be fairly abundant in the mountainous regions, but the output at present is small. Other minerals worked are copper, lead, bismuth, antimony, and zinc.

The chief domestic animals are the vicunas and the alpacas, which are bred for their wool, and the llamas, which are the beasts of burden.

The eastern lowlands include portions of the Amazonian forests in the north, and large areas of tropical grass-lands in the south. Neither of these districts is at all highly developed commercially, though some rubber is obtained from the Amazonian forest.

The *most important agricultural* region of Bolivia lies between the Eastern Cordillera and the *lowlands.* Here the elevation of the land is between 1200 feet and 3000 feet, and crops of cacao, *sugar cane, rice and* fruit, maize and wheat are cultivated.

The chief towns are: La Paz, situated near the eastern edge of the plateau, in the centre of the *most important tin and silver* mining region; Sucre, the legal capital of Bolivia, is situated on the *eastern* side of the Eastern Cordillera; Oruro and Potosi, *both situated* on the plateau, are famous for tin and silver.

The chief railways run from La Paz to the *Chilean ports of* Arica and Antofagasta; Lake Titicaca is navigable for fairly large steamers which connect at the southern end with a line to *La Paz,* and at the northern end with a line to the Peruvian port of Arequipa.

7.—Peru. In this Republic six physical divisions should be noted, viz.:—

(*a*) The Coastal Region.
(*b*) The Western Cordillera.
(*c*) The Central Cordillera.
(*d*) The high plateaux between (*b*) amd (*c*).
(*e*) The Eastern Cordillera.
(*f*) The Eastern Lowlands.

The coastal district is a continuation of the desert of northern Chile. In the south, near Arequipa, nitrates are mined; in the north, near Trujillo, some coal is mined; between these two extremes are many irrigated valleys where maize, cotton, sugar, rice, and fruits are cultivated. Here are situated the capital, Lima, and its chief port Callao.

The Cordillera are of importance only for the minerals they contain. Silver and copper are the chief metals mined, but gold, lead, zinc, and mercury are also produced in small quantities.

The plateau region is divided into three basins, the most important being that in which Cuzco, the ancient capital, is situated. Here wheat and maize are cultivated and flocks of llamas and alpacas are reared.

The eastern lowlands, known as the Montana, are capable of great development, but are still scantily populated Rubber, coffee, cacao, sugar, and other crops are cultivated.

The most important railway runs from Mollendo, on the coast, through Arequipa to Lake Titicaca, with a branch to Cuzco. [illegible] ports Chimbote [illegible] llera.

[illegible] d the natural [illegible] but the coastal region is wider, and has a hot, wet, equatorial type of climate.

In the coastal region the chief crops are cacao and coffee.

On the plateau cattle and sheep are reared and wheat and maize cultivated; little is exported from this region, there being no great mining industry as in the corresponding districts of Peru and Bolivia.

The eastern lowlands are similar to those of Peru, but even less developed. Some rubber and cinchona, the latter being a kind of bark from which quinine is obtained, are exported.

Guayaquil, thirty miles up a river which flows into the Gulf of Guayaquil, is the chief port. Panama hats are made in the locality.

Quito, the capital, though situated practically on the Equator, has a climate which has been compared to the English Spring.

The Galapagos Islands belong to Ecuador, but are of little economic importance.

9.—**Colombia.** Colombia occupies the north-eastern angle of South America and has both Atlantic and Pacific seaboards.

In the western half of the state are four great ranges, enclosing between them deep valleys; in the east are lowlands drained by the tributaries of the Orinoco and the Amazon. Sugar, bananas, cacao, cotton, rubber are cultivated on the lowlands in both eastern and western halves of the country. On the lower slopes of the Cordillera maize and coffee are grown. Minerals occur in the mountains but the output is small.

The chief artery of traffic is the river Magdalena. Railways are limited to a few short stretches constructed to avoid rapids on the rivers.

Bogota, the capital, is situated on a fertile plateau, at a height of over 8000 feet. The population is only about 150,000, this fact being a commentary on both the undeveloped state of the country and the lack of communication.

Baranquilla and Santa Marta are ports on the Atlantic coast, the latter being engaged principally in the export of bananas.

Buenaventura is the chief port of the Pacific coast.

10.—**Venezuela.** Four physical and economic divisions should be noted in this state, viz.:—

(1) The low Coastal Plain.
(2) The Sierra Merida and the Venezuelan Coast Range.
(3) The Plains of the Orinoco Basin.
(4) The Guiana Highlands.

The coastal region has a tropical climate with summer rain. Cacao, cane sugar, and tobacco are cultivated. On the slopes of the Sierra Merida the chief crops are wheat, maize, coffee, and cotton. The plains of the Orinoco, known as the Llanos, are given up to ranching, but the lack of transport has delayed the develop-

ment of the meat industry. The Guiana Highlands form a plateau over 1000 feet in height with several mountain ranges rising above it. The region is practically undeveloped, and the only [illegible]

are t[illegible]

at a height of about 3000 feet. Its port is La Guaira. Maracaibo and Tucacas are other ports. Bolivar is situated on the Orinoco, at the head of navigation by sea-going steamers.

11.—**Guiana.** The region called Guiana includes all the land between the Orinoco and the Amazon. Thus, in addition to the states of British, Dutch, and French Guiana, we may also speak of Venezuelan and Brazilian Guiana. Usually, however, the term is restricted to the three territories so-named on the Atlas map.

There are three physical divisions which run through the whole region, viz. :—

(*a*) A hot, humid coastal plain.

(*b*) A higher region of impenetrable forest.

(*c*) In the interior, where the land rises to over 3000 feet, is a region of savanna or tropical grass-land.

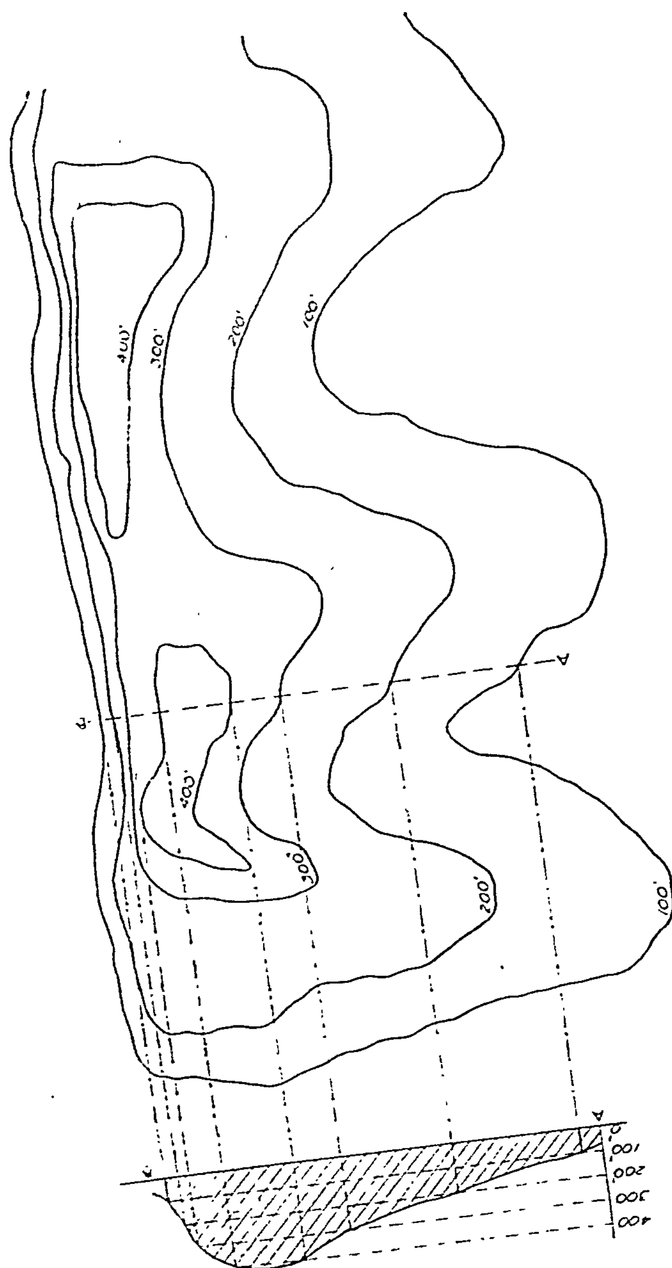
12.—**British Guiana.** The chief products are sugar, rice, coco-nuts, and bananas, all of which are raised on the coastal plain. From the forests vanilla, nutmeg, and "greenheart," a timber of great strength, are obtained. Gold and diamonds are mined.

Georgetown, the capital, is situated at the mouth of the Demerara river. It is connected by railway to New Amsterdam, a port sixty miles further east. The chief export is sugar.

13.—**Dutch Guiana,** though rich in possibilities, is little developed. Sugar, cacao, coffee and bananas are grown. Some gold is mined. The capital, and only town of importance, is Paramaribo, situated at the mouth of the Surinan river.

14.—**French Guiana** is of little importance. Some sugar, coffee, cacao, and rice are cultivated, but little is exported. Gold is the chief mineral, and rosewood is obtained from the forest. Convicts are deported from France to Guiana

Cayenne is the capital and chief port.



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